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PICKS and SHOVELS

By O. E. POTTER

In the Money

In a copyrighted column in the New York *Herald-Tribune*, James J. Montague recently made this wise remark: "Great bridge builders gain reputations, but it is the bridge teachers who make the big money." From our own experience, we might add, also the *other* bridge players.

Wash the Face!

Sounds like mother's admonition in the old days when the clarion call for dinner seemed of ever so much more importance than a smeared face and grubby hands! This admonition is of quite a different kind, but is just as good advice. The Dravo Contracting Co. makes the suggestion in a safety bulletin issued to all employees that for their tunneling operations it is desirable to wash the face of the rock before drilling. This uncovers slips and bootlegs and washes away powder lodged in the cracks. To avoid rock falls the face is tested for loose rock in blocky, slippery ground immediately after starters are drilled.

"Steam Shovel" Turns Life-Saver

A "steam shovel maestro" is the title which Louis Passarelli, of New Rochelle, N.Y., has earned by the tricks which he can perform with his power shovel. He can pick up a dime on one of the bucket teeth without disturbing the soil underneath; if he can find someone brave enough to do a "William Tell," he can lift a man's hat right off his head; and he can, for a joke, scratch a fellow's back.

It was no joke however when the sides of a deep sewer excavation in the Bronx, N.Y., recently caved in on one of the workers. In fear and silence the men stood aghast. But not Louis Pas-

(Continued on page 20)

In This Issue

	See Page
Bituminous Roads	1, 23
Bonneville Dam	9
Bridge Construction	2
Bulletins and Pamphlets	30
Concrete Curing Tests	21
Concrete Paving	2
Code Wages	6
Costs, Diesel Operation	4
Dams	8, 9
Editorials	4
Employment	4
Golden Gate Bridge	2
Grading	5
Grand Coulee Dam	8
Legal Decisions	29
Levees	1
Paving Brick Tests	4
Road Maintenance	17, 28
Road Mix	1

Roadside Materials Plus Asphalt For Surfacing

Experimental Work In Oklahoma Produced Low-Cost Highways

By CHAS. L. WILSON
Oklahoma State Highway Engineer

A STRIKING experiment in the use of roadside materials with liquid asphalt was carried on in Grant County, Okla., on U. S. Highway 60 for a distance of 4.4 miles. This stretch of road was constructed during a dry period when there was not sufficient moisture to bind the material to support even the lightest motor traffic and it was passable to horse-drawn vehicles with difficulty. The soil conditions were variable throughout the section and consisted chiefly of sandy loam and blow sand.

A 65-hp tractor was used to pull an asphalt distributor and the surface was shot in two 10-foot strips, followed by discs and tooth harrows in an endeavor to stabilize the grade. After the grade became more or less stabilized, a 15 or 20-hp tractor pulled 8-foot blades to mix the material further.

Base Mixed While Top Cured

When the grade was stabilized so that it would support the distributor and motor patrol, approximately 500 cubic yards per mile of the mixed material was moved to one side and allowed to cure. A base course was then prepared by repeating the operation. After the base course was stabilized, the top material was spread to a 10-foot width and liquid asphalt applied to

(Continued on page 18)

Smooth-Running Job with Big Draglines on Louisiana Levees

L. A. Price Proves Point Equipment Maintenance Is a Paying Hobby

(Photos on page 36)

NO man ever took more pride in his golf game, the set of the sails on his yacht, the purr of the motor in his high-powered car, or the arrangement of his valuable stamp collection than L. A. Price takes in his Bucyrus-Monighan walking dragline. He is a living example of the belief that the proverbial early stitch saves at least three-quarters of a dozen later.

The motors on the big Monighan are completely overhauled before each working season and as fall approaches with its more than constant damp weather, the electric motors are shellacked to keep out the moisture that soon ruins them. Yes, and the machine performs for its six operators as smoothly and with as little vibration as a watch. No kicks coming there for mechanical troubles for they are all stopped before they begin. Even the cables do not have a chance to break and lay up the machine for they are watched carefully and as soon as there is a sign of wear they are replaced from the reels of new cable, mounted one on each of the pontoons at either side of the machine.

Work on St. Johns-Sycamore Levee

The Providence Construction Co. of Lake Providence, La., of which the

C. & E. M. Photo

Bucket of the Walking Dragline Spotting 8 Yards on the Levee

Horton & Price Construction Co. is a part, was awarded the 7½ miles of levee Sections A, B, C, D, and E, known as the St. Johns-Sycamore Project. About one-third of this project was enlargement of existing levee and the remainer new levee. Four miles of the job was new levee on Sycamore Island, moving the existing levee nearer to the river.

The work to be described covered only a part of the 3,625,000 yards included in the entire contract which was awarded for 24.47 cents a cubic yard or a total of $887,037.50.

The preparation of the base for the new levee was done with a 4-gang Deering plow pulled by a Caterpillar Sixty diesel tractor. This cuts the roots and vines, takes the place of four or five teams and plows, and makes a better job of it as the plowing is deeper and breaks up the material into more definite furrows.

Working The Draglines

The Monighan swung an 8-yard Price bucket weighing 7,100 pounds from its 175-foot boom. This bucket is of the "basket" type to reduce weight and permit greater pay load and was developed by Mr. Price. The walker is powered with a 300-hp Fairbanks-Morse engine and General Electric motors. It rests on a 31-foot 8-inch pan and can move dirt a distance of 350 feet from one position. A Gardner-Denver stationary compressor provides the compressed air for operating the controls and for the starting of the oil engine.

There were six shifts on the Monighan with the first operator starting at midnight Saturday night and working 6 hours, then taking 30 hours off. This left two operators who lacked one shift each in making their 30 hours for the

(Continued on page 10)

COLORADO STEPS UP IMPROVED HIGHWAY MILEAGE

Working at Wolf Creek Pass in Southwestern Colorado at Elev. 11,000 Feet as Part of Colorado's Improvement Program. See page 27

New 1,218-Foot Bridge Erected by Georgia at Old State Capitol

IN the early 1800's Milledgeville was the capitol of the State of Georgia and its capitol building is still standing, housing a military school for boys. Milledgeville is on State Routes 22 and 24, the main thoroughfare between Macon and Augusta, Ga., and the old narrow bridge structure over the Oconee River had outlived its usefulness for the increasing traffic. The State Highway Department awarded a contract to Cornell-Young Co., of Macon, Ga., for the construction of a new bridge, 1,218 feet in length, with approach fills at either end. It carries a roadway 24 feet wide with a 6-foot sidewalk on the south side of the road with the sidewalk and a portion of the north side of the roadway cantilevered outside of the outer I-beam stringers.

The bridge structure proper consists of sixteen spans of 47 feet each at the Milledgeville end, two river truss spans of 163 feet each and three 47-foot spans at the east end. The approach spans are carried on pile bents, there being seventeen bents of eleven piles each, two end bents of seven piles each, including the bulkhead piles, and three similar piers, one on either bank of the Oconee River and one in midstream.

The Pile Bents

Piles varying from 50 to 55 feet long were driven to refusal with an average penetration of 20 feet, using a 5,000-pound hammer in 40-foot leads with a 2-drum steam hoist handling the hammer. The eleven piles in a bent were arranged in pairs with a single nose pile at the upstream side driven on a 1½ in 12-inch batter and bolted at the top through a 12 x 12-inch block to the short cap across the first pair of piles in the bent. The first four pairs of piles from the upstream end were vertical to the center line of the bridge but each pair was battered towards each other ¾-inch in 12 inches. The downstream pair was also battered the same amount toward the center line of the bridge. There were short caps 12 x 12 inches and 4 feet long carrying the main cap across each pair of piles in a bent. The piles were all treated by the pressure method with 16 pounds of creosote per cubic foot.

The main caps on each bent were spliced of two 12 x 12-inch timbers one 12 feet and the other 18 feet long, the splice coming at the center line of the roadway, which was not the center line of the bridge. A short cap 12 x 12 inches and 8 feet long was placed under the splice of the main cap, thus complicating the cut-off of the piles in each bent. There were also two 12 x 12-inch by

Pile Bent and Span Structure Over Oconee Built by Cornell-Young

4-foot caps under the sidewalk stringers on one side.

The bracing was all treated timber 3 x 10 inches with two sets of diagonals on each side of each bent and with a horizontal brace at mid-height of each bent. A nose of treated timber was formed over each upstream end pile of 3 x 10-inch timber with ⅝-inch bolts every fourth plank, to protect the bent from driftwood floating downstream.

The Stringers and Slab

The stringers were four 33-inch, 125-pound I beams and, under the sidewalk, one 24-inch, 70-pound I beam. The end of each stringer toward the river span was an expansion end with the other end fixed. At each expansion end there was a 10-inch diaphragm wall of concrete with reinforcing run through the I beams. At the one-third points of the stringers there were also 8-inch diaphragms of similar construction.

The concrete deck slab was 8¼ inches thick reinforced top and bottom with ⅝-inch round truss bars and ⅝-inch round top and bottom bars 2 inches from the top and 1½ inches from the bottom. A 12-inch concrete curb 7½

(Continued on page 13)

C. & E. M. Photo

The Traveling Truss with Underslung Scaffold for Finishing Under the Deck

C. & E. M. Photo

Setting Steel in the Shadow of the Paver Boom

City Paving Problems on Federal Highway

Slab on Sand Cushion, Intersecting Grades and Manholes Created Problem in Tallahassee

A COMBINED NRH and NRM contract was recently completed on the outskirts and within the corporation limits, respectively, of Tallahassee, Fla. The NRH contract was a selected base of sand and clay mixed on the road itself, with most of the hauled material being sand to stabilize the clay already in the grade. The NRM section had certain features worthy of record, particularly as the contractor had to face the problems of many manholes in the 0.737 miles of the contract and had to meet many grades of intersecting streets and care for drainage with catch-basins.

The Sand Cushion

Carrying the theory of the sand clay base of the NRH project right into the city, the specifications called for a sand cushion for the entire length of the NRM project 6 inches thick at the edges and crowned 5 inches in the 27-foot width of the street. The sand was hauled from pits 3½ and 4 miles from the job, these being the same pits used for the sand for the longer NRH project. The pavement was 27 feet wide with a 24-inch curb and gutter on either side. This work was done on Tennessee Street westerly from Adams and furnishes a new and shorter route for the main thoroughfare U.S. 90 through Tallahassee on to the west of the state.

A Caterpillar Sixty with a Galion 12-foot blade was used to cut the subgrade ahead of placing the sand cushion. Then a fleet of trucks including four GMC, three International, four Ford, five Autocar, three Indiana, and two Chevrolet trucks went to work hauling the sand cushion. Ordinarily a contractor would not have such a large fleet hauling for such a small contract but this was the fleet that was hauling for the longer NRH project and, by throwing the full strength of the fleet into the smaller contract, the hauling for that was completed in a couple of days. Thus the paving could progress that much faster and shorten the time that the street and its cross streets would be tied up. The entire fleet of trucks was equipped with Wood hydraulic hoists.

For drainage a 6-inch vitrified tile subdrain was laid on the south side of the street for the entire length of the work with open joints covered with slag, 2 inches beneath the pipe and a total depth of 14 inches. Diagonal drains were dug every 100 feet across the center line of the street and the trenches filled with slag, the coarse slag overlying the fine slag near the pipe.

Fine Grade and Forms

Four men on each side of the road set the 9-inch Blaw-Knox forms in a 2-inch trench for the 7-inch uniform reinforced concrete slab. A grading crew of eight men handled the trench and fine grade which was rolled with a Huber 10-ton gas roller after the hand crew had completed their work. The roller would not run on the dry loose sand so it was necessary to sprinkle it and then to run the Caterpillar tractor over it so that the overlapping tracks would compact the sand. Then the roller operated properly.

Making Up the Batches

The batching plant was located at the west end of the contract on a spur track where the cars of gravel from the Montgomery Sand & Gravel Co., of Montgomery, Ala., and the sand cars from the Florida Gravel Co., of Chatahoochee, Fla., were spotted and moved along by a Caterpillar Thirty with a wire rope attached to the drawbar and to the freight car truck. The sand and gravel were unloaded by an Erie steam crane with a 40-foot boom and an Owen ¾-yard bucket. The materials were delivered to the bins of a Johnson weighing batcher which produced batches of 1,695 pounds of gravel and 1,040

(Continued on page 26)

C. & E. M. Photo

Method of Supporting Deck Slab Forms

Bombing Blast Holes at Golden Gate

Pacific Bridge Co. Carried Rock Excavation 100 Feet Below High Water

IN PREPARING for the excavation of solid rock to a depth of more than 100 feet below mean high water for the San Francisco pier of the Golden Gate Bridge, the Pacific Bridge Co., San Francisco, Calif., prepared the blast holes by bombing. All blasting operations were conducted from the deck of the derrick barge Ajax, which was held in position by three bow anchor lines and three lines astern, each composed of 1¼-inch cable with 2-inch anchor chain at the lower ends. The bow cables were attached to towing engines aboard the Ajax in order to prevent breakage of the anchor lines due to the pitching of the barge in the rough water.

To make the blast holes for the large bombs, the contractor used small bombs composed of 2-inch pipe 30 inches long, loaded with 3 pounds of 60 per cent dynamite, mounted in a chuck at the end of a steel spud 8 inches in diameter by 30 feet long and weighing about 5,100 pounds. The spud was dropped vertically into its intended position from the end of a derrick boom, the force of the impact driving the small bomb a short distance into the serpentine formation. In order to facilitate this penetration the bombs were shod with cast or forged

(Continued on page 15)

TEXACO Asphalt Macadam on Ocean Road, Rhode Island—
durable, safe, economical.

MILES of this upstanding, skidproof surface crisscross Rhode Island

Types of highway surfacing constructed with TEXACO Asphalt vary from one section of the country to another, depending on available aggregate and the budget.

In Rhode Island, it's Asphalt Penetration Macadam.

Engineers of this State are to be congratulated on their success in perfecting this type of surface, which has been laid so extensively on their highway system.

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Highway Lighting—A Contribution to Safety

Adequate, economical highway lighting, which will render traffic arteries as easy of use and as safe at night as under the noon-day sun, is a problem of vital interest to more than 10,000 readers of these pages, Federal, state and county highway engineers and officials whose interest in highways carries through design, construction and maintenance to use and safety.

At Pompton Lakes, N. J., a new sodium-vapor lamp highway lighting system has recently been installed as a demonstration of what this type of highway lighting can do. It consists of two stretches of highway, totaling about 1 mile in length, with one section equipped with 4,000-lumen and the other with 6,000-lumen lamps on poles spaced 115 feet apart carrying the lamps at a mounting height of 30 feet. It is possible to extinguish alternate lights to give a 230-foot spacing and the fixtures can be lowered to any elevation desired for demonstration.

The idea of a demonstration of street and highway lighting is not new. As long ago as 1912 there was a miniature street, then a highway and boulevard set up in the shops of the General Electric Co. at West Lynn, Mass., with every detail, including the lights, exactly to scale. By means of switches one could make a careful study of intensities of lamps, spacing and heights of poles and the effect of the color of building facades and streets.

Then came Nela Park, Cleveland, full-scale demonstration which was visited by many thousands of officials interested in lighting. At South Bend, Ind., Westinghouse set up another full-scale demonstration with variable mounting heights and spacing of standards and today at Schenectady other miniature streets demonstrate effectively under uniform weather conditions, the possible variations in street and highway lighting intensities.

The thanks of the highway industry are due to the manufacturers who have made such demonstrations possible and whose interest and research have contributed so widely to public safety.

County and state officials can greatly advance the date of adequate lighting of heavily-traveled commercial routes by early applications for PWA funds for the installation of highway lighting systems.

What Do Voters Think of Gas Tax Diversion?

Gas tax diversion by politicians for use in unemployment relief has been a very serious problem for the Highway Construction Industry. It touches the pocketbook of every contractor and manufacturer of construction equipment and materials and has been a very serious threat to the stability of the industry as a whole. Few people seem to have thought, however, of the attitude of the two families of Mr. and Mrs. and Miss Voter and Mr. and Mrs. and Miss Taxpayer. We firmly believe that if it were left to the voters to decide whether gas tax money would be diverted or not, there would be a very healthy reduction in the funds stolen from the depositories of the Highway Construction and Maintenance Department.

Most taxpayers are automobile owners or make their livelihood in some industry where the motor truck plays an important part in the transportation of raw or manufactured goods. Every one of them realizes the value of satisfactory highways and city streets. You can leave it to them to demand, if the question is placed to a vote, that gas tax money be used for highway construction and maintenance and not diverted for state doles.

In support of our contention, look back at the November election in Colorado, where the voters passed amendments preventing further diversion of highway funds and rejected an amendment designing to limit the gasoline taxes to 3 cents per gallon. Those voters are highway-minded and should be honored as the first state group to use the ballot to halt political mis-use of taxes levied on highway use.

Large Public Projects Cause Migration

With the new Tappan Dam of the Muskingum conservancy flood control project in eastern Ohio now actively underway, there has been a wholesale migration into Tuscarawas County from West Virginia. According to a report by Donald Gray, United States employment agent for the county, only bona fide residents of the county will be employed. Thus, the taxpayers of every other state contribute to a national project but only individuals and families on the relief rolls of the one county will partake of the benefits offered through employment on a project which includes the construction of some 14 dams.

There is considerable question whether there will be a sufficient number of qualified laborers, both skilled and unskilled, and individuals capable of supervising the work within the one county. On the smaller projects, instituted by the county and state, there is some logic in limiting employment to the residents of the county or state which is financing the work. Isn't it equally logical—and just—to extend the area of the employment unit for large projects financed by the people of the nation as a whole, instead of confining it to a very small part of those paying the bills?

Apropos of day labor used on government work, the testimony of Rear Admiral Magruder before a House Committee several years ago might well be remembered. "It costs," said the Admiral, who ought to know, "25 to 50 per cent and in some cases, even 75 per cent, more to build warships in Navy yards than to build them under private contracts."

—*B. T. E. A. News-Letter, New York.*

De-Aired Paving Brick Show Up Well in Tests

In an attempt to obtain information that has a bearing on the relative desirability of de-aired brick as a paving material, a number of tests have been made by the Engineering Experiment Station of Ohio University. Following the A.S.T.M. procedure, three types of brick were tested for transverse and crushing strength, with results as given in the following table.

TEST DATA FOR DE-AIRED PAVERS
Manufactured by
Metropolitan Paving Brick Company,
Canton, Ohio

Size In.	Burn	Modulus of Rupture Sq. In.	Crushing Strength Lbs. Sq. In.
Canton-Royal			
3	Light*	2239	15,570
3	Medium	2294	16,060
3	Dark	2549	15,390
4††	Medium-dark**	3103	15,510
Canton-Imperial			
3½	Light‡	1620	13,560
3½	Medium**	2130	14,070
3½	Dark*	2422	14,320x
Bessemer			
3	Light	2124	11,540
3	Medium**	2233	16,400
3	Dark	2475	17,800
3	Flashed	2945	16,720
2½	Medium	2093	13,790
3½	Dark†	1815	16,390

*Brick from top of kiln.
‡Brick from bottom of kiln.
**Brick from middle of kiln.
†Brick from bottom of continuous kiln.
††Repressed type; all others Dunnlug-Vertical Fiber.
xAverage for 4 laminated samples—13,380.
Average for 3 perfect samples—15,560.

It is of interest to note that the crushing strength values are high in every case, probably greatly in excess of what is required for heavy traffic. The values for modulus of rupture show that a decided improvement is obtained by increasing the degree of vitrification from light through medium to dark brick. In general, in order to meet the specified minimum loss of the rattler test, a brick is required in which a compromise has been reached between high vitrification and consequent low absorption and toughness. Because abrasion, as evaluated by the rattler test, is becoming of decreased importance due to the virtual disappearance of iron-tired vehicles, and because resistance to breaking, which is needed to prevent failure under heavy traffic, is becoming of greater importance, it is desirable to improve the transverse strength of the brick by firing to fairly complete vitrification even at the risk of some loss in toughness, according to the report of W. C. Rueckel, Research Engineer, Engineering Experiment Station, Ohio State University, Columbus, Ohio.

Highway Work and Livelihood

Nearly 4,000,000 people normally depend quite directly on highway work for their livelihood, H. C. Whitehurst, Director of Highways of Washington, D.C., and retiring president of A.R.B.A., pointed out in his address to the convention of the Association in January.

Large quantities of materials are used in highway construction. Nearly half of the crushed stone produced by commercial quarries, or 76,000,000 tons, is used in road construction; 41,000,000 tons of the commercial sand production are used for building highways. Road construction consumes 60,000,000 tons of gravel or nearly half of the commercial production. Of the 127,000,000 barrels of cement shipped, 70,000,000 barrels are used for road building operations. Asphalts and asphaltic oils used in highway work amounted to 50 per cent of the total production of 5,000,000 tons.

About 15 per cent of the total tonnage moved by railways consists of road building materials and machinery and the annual expenditure for road building equipment is $50,000,000.

GRIEF!

C. & E. M. Photo

Illinois Mud Mires a Heavy Power Shovel—But a Little Aid from a Tractor Plus the Power of the Shovel Gets It Under Way

Conant Sees Engineer Needed In Future Social Order

Engineers will continue to occupy a place of increasing importance in the life of this country, regardless of changes in our social or economic order, according to President Conant of Harvard. In his Annual Report to the Governing Board of the University, he makes the statement:

"It seems clear that, whatever sort of social and economic order lies ahead of us, society will demand the luxuries and conveniences afforded by modern technology. There are certain to be engineers for generations to come, occupying positions of respect and importance in the community, no matter what sort of social order we may have. These scientists may be in a strategic position of influence; much may depend on the way they look at life. It is conceivable that a type of society might arise in which there would be great material prosperity and a highly developed technology but no spiritual and intellectual freedom. Under such stifling conditions all vital interest in art and literature would fade and enthusiasm for pure thought would vanish; what would remain would be a barbarism which all the radios and automobiles and skyscrapers in the world would not conceal. In such a desert, the applied scientists, essential for a smooth operation of the complex mechanism, might be the only men with a true education.

"The monks in the Dark Ages preserved the remnants of one civilization to enable another to come to life. Perhaps, in some measure at some time, the scientist and engineer may have a similar challenge. Thus a heavy responsibility lies on the shoulders of engineers and scientists and those who educate them. Today in many institutions we are developing men who understand not only their technical professions but also the needs and aspirations of the human spirit."

Diesel Shovel Operation

In a typical job under construction by the U. S. Bureau of Public Roads, a diesel shovel used approximately 25 gallons of fuel at a total cost of $2.25 for an 8-hour shift as against 50 gallons of gasoline at a total cost of $7.00 for a similar shift used by a shovel of the same dipper capacity equipped with an internal combustion engine. A saving of $4.75 per shift when accompanied, as it generally is, by increased production capacity is quite a material factor in unit costs.

In some cases it has been reported that the operating cost per cubic yard of digging with diesel shovels is only about half of the operating cost, using a shovel of the same dipper size, powered with an internal combustion engine.

—*From a paper by H. J. Spelman, District Engineer, U. S. Bureau of Public Roads, and Nelle L. Teer, Contractor, before the A.R.B.A. Convention.*

Rock, Earth and Muck Challenge Contractor

(Photo on page 36)

Earth Moving Problems Solved by Scrapers on 6.5-Mile Project Near New Haven, Conn.

A PROGRESSIVE Connecticut paving contractor was the first in the East to make use of a grading tool which has been accepted as a close rival of power shovels on many Pacific Coast earth and gravel grading projects. For its 6.5-mile grading and penetration macadam contract on Connecticut Route 80, between Durham and Killingsworth, the Lane Construction Co. of Meriden, Conn., used two Le Tourneau 10-yard Carry-All pneumatic-tired scrapers to handle heavy earth borrow and gravel excavation. One powered with a Caterpillar Seventy-Five diesel tractor and the other by an Allis-Chalmers Model L tractor, they swung back and forth between a high borrow bank and the muck hole they were filling, stopping only when someone asked questions or at the regular quitting time.

The average haul for the Carry-All was 500 to 600 feet, and the earth borrow pit was located on a steep hill which the tractor mounted with the scraper empty, then loaded an average of 6 yards per trip on the down grade. There were two somewhat similar locations, the first shown in the photograph and the second, between Sta. 80 and Sta.

C. & E. M. Photo

Going Up-Grade to Top of Heavy Cut Made Entirely by the Power Scraper

100, where a 25,000-cubic yard cut of 16 feet average depth was handled entirely by the Le Tourneau machines. The contractor normally would have placed a power shovel and three trucks in this cut to excavate and haul the material to fill the long muck hole, between Sta. 97 + 50 and Sta. 107 + 50, but the diesel tractor and the Carry-All completed the work alone with the assistance of a small tractor and bulldozer at the edge of the fill. Perpetual motion is more nearly achieved with this method of excavating than by any used heretofore.

General Grading Operations

This project, officially designated NRH 59C, is 6.5 miles long, runs east and west, and included grading, the construction of five small bridges and the laying of a penetration macadam surface. The contract was awarded March 13, 1934 and work started on April 1, 1934, with a contract allowance of 150 working days. The first grading was done at about the center of the job, working west with a 1½-yard P & H shovel. About 1½ miles to the west of this shovel, or at about the quarter point of the contract, a 1-yard P & H shovel started at the same time. Still further to the west, a ⅞-yard Bucyrus-Erie steam shovel began excavating at another small cut. Close to the west end of the job the Le Tourneau Carry-All started working on the large borrow bank to fill in the 700-foot swamp in which the muck had been excavated for a width of 45 feet at the top and from 3 to 32 feet deep by a Northwest 1¼-yard crane with a 1-yard Peerless clamshell bucket. The muck hole at Sta. 97 + 50 to Sta. 107 + 50 was excavated by a Bucyrus-Erie steam crane with a ¾-yard Peerless clamshell bucket.

Handling Rock Excavation

The total rock yardage on the job was about 50,000 cubic yards. At Sta. 148 a rock cut with a maximum depth of about 20 feet and containing about 10,000 cubic yards of rock was drilled with an Ingersoll-Rand wagon drill, using steel 16 to 24 feet in length. The wagon drill was supplied with air by

(Continued on page 17)

Write for Circular

NEW and IMPROVED
No. 64-C
"Bull Frog"
Steel Tray
Mortar and Concrete
BARROW
Capacity, 4 cu. ft., heaped

Iron cross bars over the frame and under the tray make a more substantial frame and give added support for the tray. Legs, channel iron, securely riveted.

THE TOLEDO WHEELBARROW CO., Toledo, Ohio, U. S. A.

GAS-ELECTRIC

The Outstanding Development for Modern, Low Cost Road Building

ROAD FINISHERS

Here is a road finishing machine built for contractors who want speedy, smooth—*low cost* paving. The finishing machine you buy should have these features:

Cushioned electric power, properly applied to take the operating shocks without undue stress or wear. No clutches . . . few gears.

Four speeds forward and four speeds reverse—and faster.

Faster and cheaper for changing machine widths, adjustable by inches.

Greater traction for heavier loads.

Positive steering, with automatic brakes for steep grades.

Designed for electric vibrating attachments, tamper and all accessories for bituminous paving.

The Blaw-Knox Gas-Electric Road Finisher produces more square yards of finished slab per day and a higher quality of work—it is tuned up to the high pitch of modern paving operations.

We would like to tell you about the successful performance of the Gas-Electric on many jobs—how you can look forward to better progress and profits on present and future paving work.

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Offices and Representatives in Principal Cities

BLAW-KNOX

THE NATIONAL CARBIDE V-G LIGHT

Gives you daylight conditions on night jobs.
Spreads a full, even beam of 8000 candlepower right where you need it.

Lights up the job for twelve hours on one 7-pound charge of National 14-ND Carbide and 7 gallons of water. Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working.

Weight 35 lbs. empty; 98 lbs. when full.

Write for catalogs on V-G Lights, V-G Handy Light and Lantern

NATIONAL CARBIDE SALES CORP.
LINCOLN BLDG. NEW YORK
(Opp. Grand Central)

Hourly Wage Scale Reduced in South

At its meeting in Washington late in January, the Construction Code Authority asked NRA to reduce the minimum hourly wage for unskilled labor in eleven southern states. These states include North Carolina, South Carolina, Georgia, Florida; Alabama, Tennessee, Louisiana, Mississippi, Texas, Arkansas and Kentucky.

The southern construction wage, particularly for unskilled labor which is not migratory, has no competitive relation to the construction wage paid in other parts of the country. However, the wage paid to unskilled construction labor in the south is highly competitive with the wage paid the same class of labor by other industries. Unskilled labor rates fixed by other codes generally are below the rates fixed by the Construction Code, creating the tendency for these other industries to go into construction work on their own account, particularly for maintenance and repair, and thereby eliminate the contractors who serve these industries.

The 40-cent an hour minimum for unskilled labor represents as high as 100 per cent increase over the average wage for unskilled labor actually being paid, and a substantial increase in the highest unskilled wage ever paid prior to the Code. The increase is too great to be assimilated at one time, and is generally unenforceable.

Employers, and the public, object to paying 40 cents an hour to the class of unskilled labor which is prevalent. This general attitude of mind has expressed itself in a growing opposition to the Code in the South, as evidenced by the lower wages established in work by States and municipalities when they are authorized to fix wage scales and hours of work.

Emergency Carbide Light Always Ready for Use

A new carbide emergency light weighing only 40 pounds when fully charged, and which burns for three hours, giving 8,000 candle power, has recently been announced by the National Carbide Sales Corp., Lincoln Bldg., New York City. Announced as a police emergency light, it has many other applications in the municipal and construction fields.

The reflector is mounted on a universal swing joint, so that the light may be shifted to any angle and may be easily folded down for carrying by a convenient handle above the carbide hopper. The unit is 42 inches high when extended for use, and 28 inches folded.

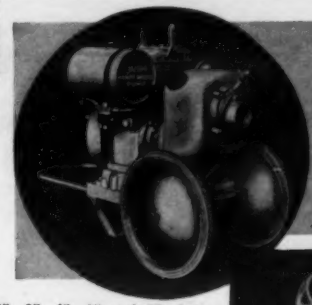
A 1¾-pound charge of carbide placed

New Emergency Light

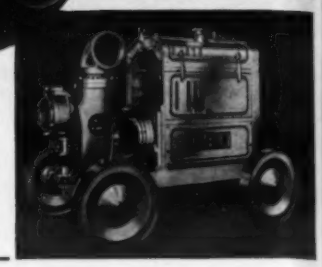
in the hopper is sufficient for over 3 hours service. The light may be operated intermittently, as needed, without the waste of any of the charge. By throwing a lever, the carbide is released a few grains at a time into the water tank below, and then the rate of feed of the dry carbide is regulated automatically by the gas pressure. The light is shut off by throwing the lever back to the locked position. The tank is made of 18-gage sheet steel, hot-dipped in lead after the tank is welded. There is no spilling if the light is upset, and it is usable immediately when righted.

JAEGER "SURE PRIME" PUMPS
(10,000 TO 135,000 GALS)

Left: "BANTAM WEIGHT" 8500 Gal. Portable Pump



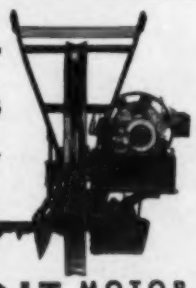
$115.00
$10 Extra for Rubber Tires
buys this
8500 Gal.
"Handy Model"



Built in 2", 3", 4", 6" and 8" sizes, Jaeger Heavy Duty Self-Priming Centrifugals are world's largest selling pump of their type for construction jobs, industrial work, public utility and municipal maintenance, etc. JAEGER WELL POINT SYSTEMS provide "dry job" conditions at lowest known cost. Used on small jobs and biggest. Send for new CATALOG P-35.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

CUT MOWING COSTS... with a



DETROIT MOTOR SCYTHE

- Here is the most economical and easily handled cutter on the market
- It goes anywhere, cuts anything, and enables one man to do the work of four or more with hand scythes.
- It has a 36-inch sickle driven by a powerful one-cylinder gasoline motor and is mounted on a free running 30-inch wheel, allowing it to be backed up, pivoted sharply, or tilted up or down slopes similar to a wheelbarrow.
- It is now produced by a recognized leader among mower manufacturers and during over four years of service, thousands of users have enthusiastically testified to its dependability.

Write for prices and Bulletin No. 3

DETROIT HARVESTER CO.
5450 W. JEFFERSON AVE., DETROIT, MICH.

CONTRACTORS

Now You Can Lubricate with Alemite Powergun Equipment

—*Reduce Labor Costs 50%*

Courtesy List & Clark Construction Co.

New Alemite Equipment When Mounted on Trailer or Truck Permits Powergun Lubrication of Road Machinery While on the Job— Insures Correct Lubrication at ½ the Labor Cost

● Now, by simply mounting the new Alemite Powergun equipment on a trailer or truck and connecting it to a gasoline-operated air compressor, you can cut lubrication time ½ and be sure that the job is done correctly *every time.* With tons of pressure at his command, one man can easily handle every machine on the job—flush out dirt, dust from bearings—introduce new, clean, live lubricant and reduce repairs up to 80%.

Contractors now using this Alemite Powergun equipment find that it increases the efficiency of every machine on the job—Crawler-type Tractors, Graders, Trucks, Power Shovels, etc.—state that it will actually pay for itself wherever four or more units of Power Grading Equipment are in use.

Get the complete details on this remarkable equipment now. Learn how you can use an Alemite Powergun on any job at any location. Your equipment jobber will gladly explain how you can take advantage of its savings, or a note on your letterhead will bring complete information to your desk. No obligation. Write to:

ALEMITE CORPORATION
(Div. of Stewart-Warner Corp'n.)
1850 Diversey Parkway Chicago, Illinois

Alemite Specifies

For plain bearings on construction machinery, Alemite Lubrication Engineers recommend Alemite Temprite Lubricant No. 33 E.P.—a pure, solidified oil that will stand extremes in temperature, moisture and pressure—remains plastic in the bearing, sealing the closure against entrance of dust, dirt and other abrasive substances.

For lubricating Ball and Roller bearings, Alemite Lubrication Engineers recommend Alemite No. 38—a lubricant that has been especially developed for this use, and one which has the approval of leading manufacturers of bearings of this type. It is suitable for use in all Alemite High-Pressure Systems—meets all requirements under extremes in temperature, pressure and moisture.

★ ★ ★

This man is protecting equipment investments and reducing maintenance costs for hundreds of contractors. He cuts repair costs as much as 80% —keeps equipment "on the job." Is he working for you?

ALEMITE
Reg. U.S. Pat. Off.
Controlled Application of the Correct Lubricant

(Advertisement)

Iowa County Shows Progress In Past 5 Years Highway Construction

Dallas County, Iowa, according to recent reports, stands today in an advanced position on highway development in spite of pressure for low cost operation during the depressed years. This is due to a combination of circumstances including progressive legislation, good capable men, and well chosen equipment. An explanation of the conditions may prove helpful to highway executives elsewhere or others engaged in road construction.

Dallas County is fortunate in having a liberal supply of gravel suitable for road-surfacing distributed throughout its area. It is also fortunate in the fact that when the State law was changed to bring all the roads under county control on January 1, 1930, the system of county trunk highways had been almost completed. And it is especially fortunate in the selection of its Board of Supervisors—and in the choice of I. C. Buckman as County Engineer.

For the benefit of those who do not know the location of all their own counties, let alone those of other States, it should be explained that Dallas County, Iowa, is the first county west of Des Moines, the State Capital. Adel is the county seat. The population of the county is about 25,000.

County Ranks High

When the county took over the entire road system in 1930, it stood first in the State in percentage of improved road-mileage and ranked second in total miles of improved roads, with a total of more than 900 miles of secondary roads. The wide distribution of suitable gravel, which seldom makes a haul of more than five miles necessary, was one of the major factors in the advanced condition of the highway system at that time. This gave an excellent foundation on which to proceed with a building program.

Long Range Planning

In the further development of the roads, it was decided to do only work of a permanent nature. The county system of trunk highways has been completed in accord with this plan, even to bridges of a permanent type, and the county is now spending its energy on maintaining this system and in the development of the local, or township, roads. At present, by far the greater part of the unimproved mileage in the county is in the south along the south branch of the Racoon River. This is rough country where the cost of construction is high and the number of people to be served low as compared to the northern part of the county. The system of doing only permanent work does not make a great showing so far as mileage of new construction is concerned, but it has the decided advantage that a road once built is finished except for regular maintenance.

The program for 1934 called for the completion of about 51 miles of gravel roads. Thirteen and one-half miles were graded in 1933 and 37½ miles in 1934. Some of the grading was done by the county's own outfit consisting of two tractors, two blades, one elevating grader and four scrapers—some $20,000 worth of equipment. This outfit moved 131,870 cubic yards of material last season, of which 108,316 was cast direct on the embankment and 23,554 was hauled. Additional grading to the amount of 242,854 cubic yards was let to C. G. Blythe & Son of Tama, Iowa.

The job was financed 30 percent by P.W.A. Funds and 70 percent by County Construction Fund, and, of course, local labor was used. The men worked in two 5-hour shifts per day. There were 37,000 cubic yards of material to be moved in three miles, some of which was cast and the remainder hauled in

(Advertisement)

Western 1½ yard wagons.

In 1930, the present system of maintenance was started and it took a lot of nerve to embark on such a course in face of the existing economic conditions. Equipment was purchased so that a one-man power maintainer could be stationed in each township to serve an average of 55 miles of roads. A patrol man on full time is maintained in each township with full responsibility for the roads in his district. Maintenance by this method has been highly successful.

Since 1933 the maintenance and much of the operating work has benefited by the discovery of the Austin-Western 77 Motor Grader and its low operating cost combined with great versatility. That year one of these machines was operated and the following year two more were added. In 1934 Mr. Buckman commented on them as follows: "All three of the machines have been in use for well over a year, and we are more than pleased with their performance

(Advertisement)

and the service rendered by you. They have been used on all types of maintenance and we have found that with the Heavy Duty 6-cylinder motor, and the positive 8-wheel drive, it has been possible to speed up our maintenance to a very noticeable degree."

Minneapolis Contractors State Grader Requirements

A representative, seeking practical opinions of contractors on grader operation, recently uncovered an interesting viewpoint. The comment was made by Phillippi Brothers, enterprising Minneapolis contractors, in response to a question on a recently purchased Austin-Western No. 11 Blade Grader. Mr. Phillippi said: "She sure is a peach, and do you know what we like most about it? It's the curvature and the way the blade is hung. They sure knew what they were doing when they built

(Advertisement)

it. It seems to handle lots more dirt easier than anything we've ever had. The dirt rolls out nice over the front of the blade, but it is not rolled around sharply in such a way that a binding action results. We had a -------- 12′ on the job while we were waiting for yours and I never realized there could be that amount of difference in a grader. I've been under the impression that a blade is something made to push dirt around that is hung from a frame on wheels, but the Austin changed my mind after I finished assembling it and seeing it work. There isn't a doubt in my mind that she'll pay for herself on this job. And another thing, do you know it's the first time in our history that we got a real set of tools with a machine. The master mechanic has all the Austin tools corraled and prizes them highly."

Further information on equipment mentioned on this page can be secured, from the manufacturers, The Austin-Western Road Machinery Co., Aurora, Ill. (Dept. Y.)

"77" EARNS ITS WAY

Check these

COST FIGURES

The Hewitt-Judd Co. reports costs on the "77" shown at the right:

GASOLINE
Blewett Pass job, grade better than 2½%—2.7 gals. per hour. Benton County job, level, soil sandy—2.3 gals. per hour.

OIL
Sixty hours of work, no additions.

GREASE
Estimate one pound per day.

ROAD MIX PER 8-HOUR DAY
Averaged .9 mile on 18-foot road, 2 inch compact mat.

DEPRECIATION
usually figure one-third. Believe 25% sufficient for these machines.

Hewitt-Judd Co., Yakima, Wash., operating three "77's".

The Cherry Valley Turnpike near Syracuse, N. Y., offers entirely different conditions for the "77" of the Wm. P. McDonald Construction Co. of Flushing, N.Y.

Jack A. Casson, Haywood, Calif., gets results in sandy soil.

By **MEETING LOCAL VARIATIONS** *of* **Climate . Grade . Conditions . Material**

One significant test of a road machine is its ability to surpass the common experience of users in widely different localities. The highly satisfactory work of Austin-Western 77s has won preference for them in New York, Arkansas, Washington, California—throughout the nation.

A report of good performance emphasizes certain details when it comes from a hilly section of Arkansas—and certain other superiorities when the report is made on operation in the sandy soil of California. Contractors know that a wide range of conditions must often be met in adjoining counties.

Yet the 77's versatility goes beyond this to a variety of work in one location—light ditching, maintenance, scarifying, oil mix, grading, snow removal, etc. Be sure you know the full range of Austin-Western 77's capacity, ability and economy. Send the coupon.

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The Austin-Western Road Machinery Co.
Y Aurora, Illinois
Please tell me more about the Austin-Western "77" Motor Graders.
Name.....
Address.....
City..... State.....

Grand Coulee Plant Survey

(Photo on page 36)

WITH work at Grand Coulee Dam proceeding at a rapid pace, it is interesting to survey the array of up-to-the-minute equipment which is contributing to the progress being made on this major construction project. According to a survey made by R. J. Cugelman, contact man, the Mason-Walsh-Atkinson-Kier Co., which was awarded the $29,500,000 contract for building the dam, has the following equipment:

Two 5-yard Bucyrus-Erie electric shovels, two 4-yard and two 3½-yard Marion electric shovels, two 2-yard Marion diesel shovels, one 2-yard and two 1½-yard Bucyrus-Erie diesel shovels, one 1½-yard Thew-Lorain diesel, one Type 450 Marion crane and one Type 75 Thew-Lorain crane.

Motor Trucks

There are thirty-five trucks, with a combined capacity of 326 yards, in use: three 14-yard and twelve 12-yard Macks, nine 8-yard International trucks, three 8-yard Sterlings, four 6-yard Macks and four 5-yard Whites. In addition there are one 15-ton Walter four-wheel drive tractor truck, thirty passenger-type service automobiles and twelve service trucks.

Tractors, Compressors, Trailers

Other equipment includes sixteen 75-hp Caterpillar diesel tractors, eight of which are equipped with bulldozers, three Allis-Chalmers compressors, four Worthington compressors, one Schramm compressor, three Ingersoll-Rand stationary compressors, a 36-ton trailer, and a 63-ton trailer, specially built for the heavy hauling by the Union Iron Works. This trailer has already hauled four transformers, each weighing over 20 tons, from Coulee City to Mason City on the east side of the Columbia.

Record Belt Conveyors

The two largest belt conveyor systems for moving dirt ever constructed, and which were furnished by Jeffrey Manufacturing Co., are in use on this project and will be described in more detail in a later article in CONTRACTORS AND ENGINEERS MONTHLY. There are also two barges, each 30 x 70 feet, with a capacity of 300 tons, one 50-foot pile driver with a 5-ton steam hammer, three stiffleg derricks, three skid derricks and four Whirley's.

Atkinson's Trucks

Guy F. Atkinson Co., which is hauling the dirt for the M-W-A-K Co.'s shovels on the west side excavation, is using three 14-yard and nine 12-yard Mack trucks, one 12-yard, eight 6-yard and eight 5-yard White trucks, two 11-yard and three 9-yard Sterling trucks, six 8-yard International trucks, two 6-yard Indiana trucks and four 5-yard Macks, a total of 46 trucks with a combined capacity of 379 yards.

Railroad Builders

Crick & Kuney, which is building the combined railroad and highway grade from the junction of the Almira-Coulee City road to Osborne Canyon, is using two 2-yard and one 1½-yard Bucyrus-Erie diesel shovels, one 1½-yard Northwest gas shovel, three 1½-ton service trucks, six 310-foot compressors, two 60-hp and one 30-hp Caterpillar tractors, fifteen rock drills, one Adams road patrol, two Ford pick-up trucks, four 12-yard and two 8-yard Mack trucks, two 12-yard White trucks and two 8-yard International trucks.

It is interesting to note that the combined capacity of the ninety-one dump trucks is 805 cubic yards, and the combined capacity of the sixteen shovels is 42½ cubic yards.

New Vacuum Control for Power Excavators

Among the new developments announced at the Highway Exhibit held in connection with the American Road Builders' Association Convention in Washington in January was the new Osgood vacuum clutch control for heavy-duty power excavators, recently brought out by the Osgood Co., Marion, Ohio.

This new feature of Osgood shovels is a new application of a well-known force. In this application, vacuum created by the engine is used to actuate the swinging clutches. Taken from the engine and led to the operator's position, vacuum is there controlled by a simple, efficient and durable valve which, requiring no more pressure than can easily be exerted by the touch of one finger, controls all the swinging and traveling motions. Thus, with this new control, no power from the prime mover is sacrificed; the effort required to swing the machine and travel the machine is virtually nil, according to the manufacturer.

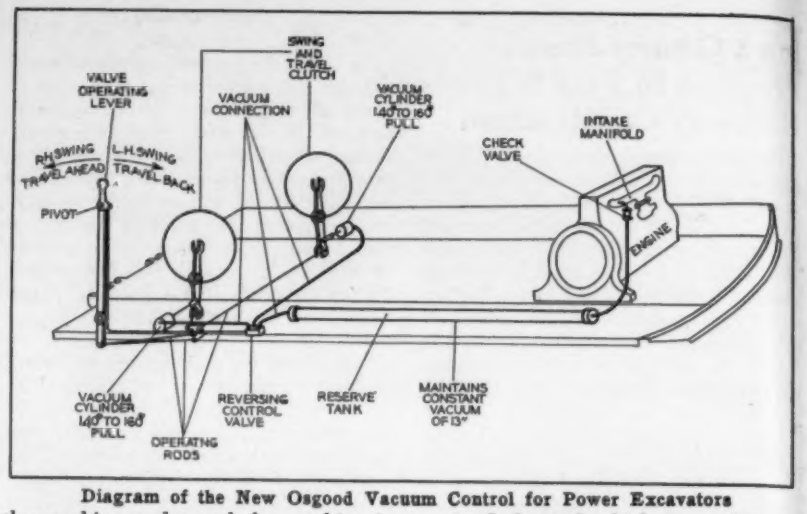
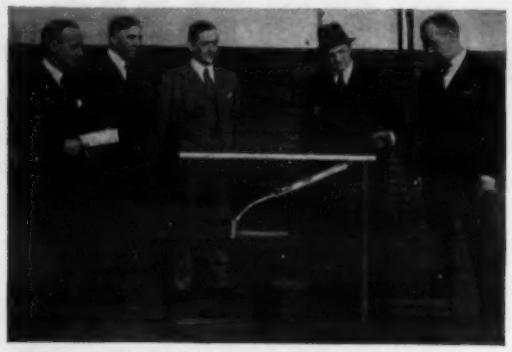
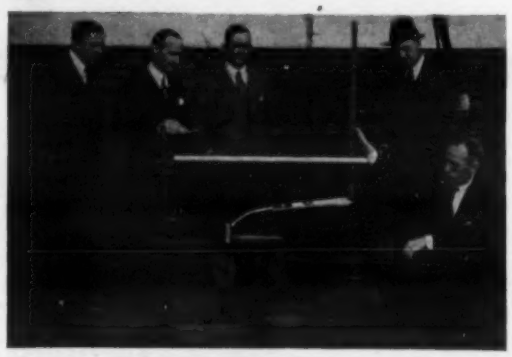


Diagram of the New Osgood Vacuum Control for Power Excavators

A flexible line is led from the manifold on the engine, to a reservoir conveniently located, which reservoir stores up enough vacuum so that the clutches can each be operated several times, and there is always energy at hand for use throughout all the cycles of operation.



1 The shovel is firmly fixed by the blade in the testing machine.



2 A 250-lb. weight has deflected blade and handle 7½ inches. The spring of the blade has taken up this strain, equivalent to the weight of the heaviest workman.

3 After 5 minutes the weight is removed. The shovel springs instantly back into shape, without a crack or sign of strain, with only ⅜-inch permanent deflection at the tip of the handle.

CLOSED-BACK
sets new standard for socket strength

Graphically, Wood engineers demonstrate what happens to a Wood Closed-Back shovel when it is carelessly used as a crowbar. Nothing happens! Wood shovels can take it, because they have greater strength in the socket, no strap welds to break.

But photographs cannot show how the same resiliency makes *shoveling* with a Wood Closed-Back easier. Pictures will not tell you that the steels in Wood shovels are harder, tougher to endure the most battering treatment, to last under the hardest wear.

And worthy of good materials are the Wood refinements in design. The Closed-Back permits sturdy one-piece construction, a strong, heat-treated shank, and an absolutely smooth back. Turned shoulders save shoes and shovels, the Tapered Socket gives new balance and strength.

Buyers discover that Wood shovels are really cheaper. Grade for grade Wood quality makes Wood shovels outlast all others. Address The Wood Shovel and Tool Company, Piqua, Ohio, U. S. A.

WOOD'S

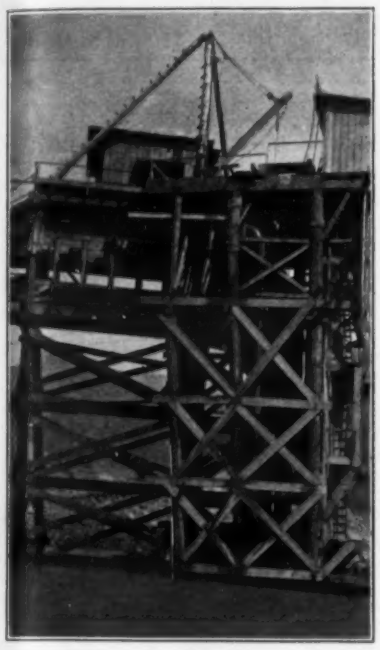
Shovels · spades · scoops

In these famous grades . . . "Mols" (Mo-lyb-den-um) . . . "Big Fist" . . . Wood . . . Stuart . . . Piqua

Pumping "In a Big Way" at Bonneville Dam

Big Battery of Pumps of 90,000-GPM Capacity Used for Dewatering at Power House Site

THE unwatering of a body of water for construction purposes offers some of the most interesting problems encountered in a business rife with problems, dealing not only with the moving of a definite amount of water within a given time, but also with a series of related situations which require an economical solution. When work has progressed to the unwatering stage, a great deal of money is tied up in uncompleted construction, and daily overhead expenses are very great, so that no delay in the construction program can occur, if the contractor is to take his profit with him at the completion



The Structure From Which the Pumps Were Suspended. The Original Water Level Was 56.5 Feet Higher than Shown

of the work. Also, a limited working season may mean that a week's delay at that time causes a year's delay in the final completion of the project.

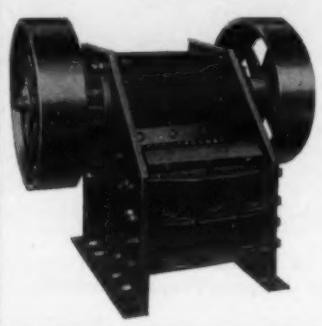
Problems at Bonneville

Such a problem arose at Bonneville, on the Columbia River 40 miles east of Portland, Ore., where U. S. Engineers are building a dam, power house and ship locks for the development of power and for the improvement of navigation. At the site of this work, the Columbia River is divided by Bradford Island. The power house, which will form the dam on the south side of this island, is being constructed first, though the main spillway dam in the north or main channel has already been started. During the construction of the power house, the water from the south side is being diverted into the main channel. A contract for unwatering and excavation for the power house and locks was awarded to the Guy F. Atkinson Co. of San Francisco, on February 6, 1934.

At the site of the Bonneville power house dam, the water in the river at the lower cofferdam ordinarily varies during the proposed pumping period from a minimum of about +15 feet to a maximum of about +32 feet. It was planned that the work would be completed within the cofferdams before the high water of the early summer which might take the water above the cofferdam's level. In order to expose all bed rock properly, it was necessary to unwater to about —55 or 60, giving a maximum head of 85 or 90 feet against the cofferdam.

On this job the river bed is of such a nature that within the area enclosed by the cofferdams and just below the power house, there is a hole going down to Elev. —75, which was used as a natural sump into which practically all of the drainage was directed. In this respect, one of the most serious problems often encountered, that of obtaining a suitable sump for the pumps, was solved by nature.

(Continued on page 22)



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Complete Portable or Stationary Plants
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HEATING KETTLES CHIP SPREADERS
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BEEBE ALL-STEEL HAND HOIST
Capacity—5 tons straight line
Weight—110 pounds
Size—16x17x13" high
Two speeds—4 to 1; 24 to 1
Positive internal brake
Price $75. Write for list of dealers
BEEBE BROS.
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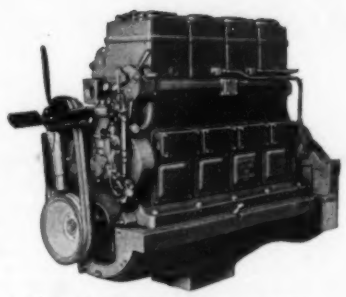
REPLACE costly gasoline power WITH economical, efficient
CUMMINS DIESEL ENGINES



105 H. P. INDUSTRIAL ENGINE

• CUMMINS offers a complete line of Diesel Engines ranging from 35 H. P. to 200 H. P.—for Automotive, Portable Power and Stationary Power Applications. Find out how readily these modern, efficient engines can be installed in your present equipment to replace gasoline engines.

The LINN Diesel-Powered Tractor—standardly equipped with CUMMINS Diesel Engines—moves heavy loads economically and dependably. More than 50 CUMMINS-powered LINN Tractors now in daily service. Ask for performance proofs.

WHEREVER CUMMINS Diesel Engines have replaced gasoline power, they have established remarkable records for power efficiency, fuel economy, operating dependability and low-cost maintenance.

More and more contractors and government officials are wisely turning to CUMMINS Diesels to cut costs and speed up work. One operator, using a CUMMINS-powered LINN Tractor for road and bridge projects, reports a saving in fuel cost of approximately 75% over gasoline power for similar work. This is typical of the experience of many users of CUMMINS Diesel Engines.

These modern Diesel engines have the "backbone" for the toughest jobs. Put them to the hardest service on automotive, portable and stationary equipment and they will deliver a standard of performance impossible with gasoline power. They have greater capacity—they move heavier loads—they speed up your operations. They can be relied upon at all times to give dependable, trouble-free performance. And they deliver power at an amazingly low cost!

"IT PAYS TO BE DIESEL-WISE"

Within the past three years, Diesel power has made tremendous strides—and CUMMINS is the leader in Diesel engineering advancement. In the heavy-duty truck field alone, CUMMINS Engines have a record of millions of miles of proved performance. Let us give you complete facts. In writing, please list your present gasoline-powered equipment.

CUMMINS ENGINE COMPANY • COLUMBUS, INDIANA
—The Leader in Diesel Engineering Advancement

SALES AND SERVICE IN PRINCIPAL CITIES THROUGHOUT THE U. S.

Smooth-Running Job on Louisiana Levee

(Continued from page 1)

week. This was taken care of by putting them on one of the smaller machines for the balance of the time.

The Monighan handles about 8,000 yards of dirt per 24-hour day or 200,000 yards a month. This is a slightly higher yardage than that of most machines of this type, because of the highest degree of maintenance required and also because the operators work shorter shifts and hence are fresher for their tour of duty.

For each shift the walker carries the regular operator, a deck man, an oiler and a spotter. There is also an electrical man on call at all times.

Backing up the work of the large machine and assisting it to maintain its yardage day in and day out were two other machines. A 46B Bucyrus-Erie dragline with a 75-foot boom cast in dirt from the end of the borrow pit for the big machine to rehandle to the levee. A 2W Bucyrus-Monighan dragline with a 65-foot boom and a 2½-yard Price bucket was used to cut the search trench ahead of the levee.

The large walker carries a 4-kw Moon lighting plant operated by a LeRoi gas engine. A Kohler 1,500-watt plant is installed on the 46B machine for lighting and a 1,200-watt plant of the same make is mounted on the 2W. No extra lights were carried on the job. A large Curtis X-Ray floodlight is mounted at the end of the Monighan boom, giving complete illumination for the night work. No hand work was done at night so general illumination was unnecessary.

For use in wet weather the contractor carried a set of 16 heavy mats measuring 18 x 20 feet and built up of 4 x 12-inch lumber. These were placed under the pontoons to permit them to get a better grip in moving the 500-ton machine through the large tracking gear. On one of the pontoons there was a reel of Williamsport wire rope and on the other a reel of Leschen cable, ready for any emergency.

Dressing Slope

A 3-up mule team, almost the only relic of the old days of moving dirt entirely by mule team, working with a fresno dressed the riverside slope of the levee section and a crew of five hand laborers, working the daylight shifts, completed the dressing on both sides. On the landside a Caterpillar Thirty-Five with an Athey bulldozer did the rough dressing ahead of the hand crew. Formerly as many as 100 negro laborers per shift were seen on the slopes of the levees dressing them to the finished grade and smoothness.

After the slope of the levee had been dressed and accepted by the engineers the sodding crew went to work. Pieces of sod collected from approved sections were cut up and placed in the levee

C. & E. M. Photo

A Beacon Floodlight and 1,500-Watt Lighting Plant Skid-Mounted for Easy Portability

slopes on 18-inch centers. In favorable weather this grows rapidly and spreads quickly, knitting the earth together and preventing washing of the slopes. Just prior to the placing of the sod this contractor smoothed the slope with a large log drag, leaving the slope looking like a well-graded garden. The engineers require the contractor to cut the weeds and grass if they grow high as too luxuriant a growth of weeds will choke out the grass. Weed roots are scanty

(Continued on page 16)

Prepares Own Aggregate

R. M. Jackson, a Rocky Ford, Colo., contractor, has recently purchased a Cedar Rapids one-piece crushing outfit so that he now is able to crush, size and deliver to his waiting trucks all the aggregate his operations require. The purchase was made from the H. W. Moore Equipment Co., distributor, of Denver, Colo.

MILE AFTER MILE

Mile after mile and job after job of black top and concrete have been completed without a single bump with FLEX-PLANES. No other machine has the utility or adjustability of FLEX-PLANE Concrete and Black Top Finishers—from 9 to 50 feet wide.

Equipment furnished by

FLEXIBLE ROAD JOINT MACHINE COMPANY . . . WARREN, OHIO

KEEP THEM DOWN! WITH Miles CONCRETE EQUIPMENT

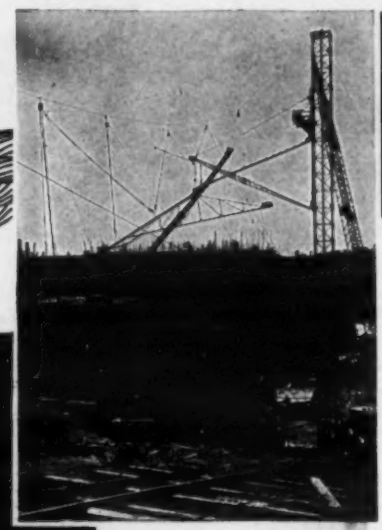
for the production of concrete blocks, concrete building tile and concrete bricks.

→COSTS

MILES MFG. CO. Jackson Mich.

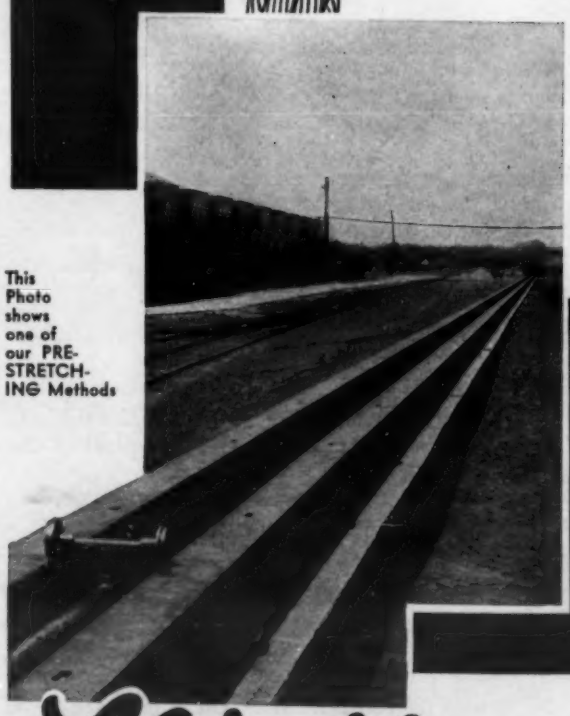
Let's Get Together

and study with you



Your Wire Rope Problems

By reason of the vast technical experience we have compiled in relation to the use of ropes of proper construction in various operations, we may be of great help to you in the economical operation of equipment that may now be causing you trouble and excessive expense.



This Photo shows one of our PRE-STRETCHING Methods

WRITE FOR LITERATURE

PURPLE STRAND

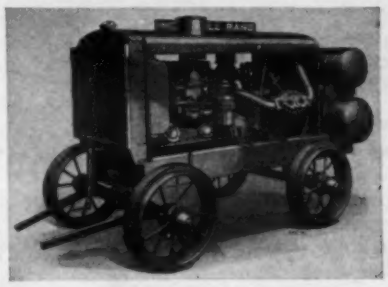
Williamsport WIRE ROPE COMPANY

Main Office and Works: WILLIAMSPORT, PENNA. Branch Offices: 122 S. MICHIGAN AVE., CHICAGO

New 85-CFM Compressor Added to I-R Line

A new two-stage, air-cooled portable compressor has been added to the extensive line of portables made by Ingersoll-Rand Co., 11 Broadway, New York City. The new model is No. 85, is driven by a Waukesha gasoline engine, and has a capacity of 85 cfm at 100 pounds. It has two low-pressure and one high-pressure air-cooled cylinders and an air-cooled intercooler.

It is claimed by the manufacturer that the air-cooling, two-stage compression, intercooling, and certain manufacturing refinements all combine to make a saving of up to 25 per cent over the fuel cost of water-cooled, single-stage portable compressors. It is also claimed that two-staging gives increased efficiency over single-stage units at high altitudes and in hot climates. Cylinders and valve temperatures are said to be 200 degrees lower than in single-stage units, resulting in tighter valves and longer maintained high efficiency.



The New 85-CFM I-R Compressor

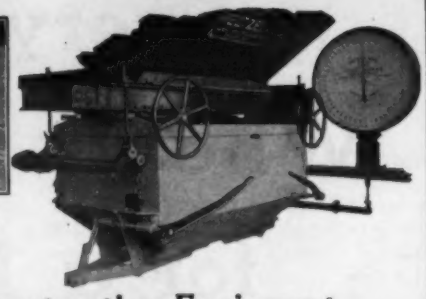
Care and Foresight Pay!

A CWA safety inspector saw that the banks of a gravel pit had been softened by heavy rain. He instructed the men to work in another part of the pit, which they did. Next day, the softened bank caved, bringing down hundreds of yards of material. A dozen men would have been engulfed had it not been for the inspector's foresight.

HELTZEL

MAINTAINS LEADERSHIP

Steel Forms Batching Plants



And a Complete

Line of Modern Construction Equipment.

For Literature and Further Information

THE HELTZEL STEEL FORM & IRON CO.

Warren, Obio, U.S.A.

New Industrial Engine Burns Furnace Oil

The recent announcement of a line of overhead-valve fuel-oil-burning carbureted spark-ignition tractor and stationary engines has created considerable interest in the industrial and construction field. This development by Continental Motors Corp., Detroit, Mich., makes it possible for gasoline engine operators to reduce their actual operating costs 30 to 40 per cent, depending upon fuel oil prices in the various sections of the country, without affecting the desirable performance characteristics of the gasoline engine and without increasing the cost of maintenance.

Ordinary furnace oil, known as No. 1, is used in these engines with no difference as far as acceleration, power and smoothness of operation of the engine is concerned. There is no smoke at varying loads and only slightly visible puffs of white vapor at moments of deceleration.

The power units, in both the open and closed models, and industrial engines are now available in 6-cylinder heavy-duty type of 381, 428 and 501 cubic-inch displacement.

Eliminating the Hazards of Grade Crossings

Much attention is being given by Colorado to the elimination of grade crossings and on the State's Federal-Aid system of highways alone twenty-two crossings have been eliminated by overpasses, twenty by underpasses, and sixty-six by relocating highways. The elimination of these railroad crossing hazards will be continued as rapidly as funds are made available for the work.

Why do Hyb-Lum Wheelbarrows REDUCE HAULING COSTS?

for the simple reason that

being made of aluminum alloy, less than half the weight of steel, they permit a bigger pay load—*15% bigger.*

Sheet Aluminum Corporation, Jackson, Mich.

They Stand the Gaff

OF GOVERNMENT SERVICE . . .

One of fifteen power-operated graders, ten-foot blade, recently delivered to U. S. Forest Service, California.

Above: U. S. Forest Service Machine. Note steep bank cut on mountainside road.

Below: The U. S. Soil Erosion Service has a number of these eight-foot blade machines in operation.

IF THERE is any place in the world where a road grader is punished to the limit, it is in the U. S. Forest Service. Put one of the C.C.C. boys on it—well intentioned but probably inexperienced—and does he "give it the works"—over the hills and through the woods he goes, cutting through roots and saplings and bouncing from one rock to another.

Adams Leaning Wheel Graders are making good under these conditions and they are well represented throughout the country, not only in the U. S. Forest Service but in the National Park Service, U. S. Soil Erosion Service, among the Indian Agencies, etc. The point is—if Adams Graders meet the severe conditions of U. S. Government service, and the wide range of blade adjustments required, they will make good graders for you whether you are highway official or contractor. These graders are available in blade lengths of 6½ to 14 ft., suitable for any power. Larger models available with power-operated controls.

Why not write today for the new Adams Leaning Wheel Grader catalog illustrating and describing various construction and operating advantages of these machines?

J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA

Branches, Representatives and Distributors Throughout the United States

ADAMS LEANING WHEEL GRADERS

An Open Invitation to Every Contractor Who Is in the Market for a New TRUCK

FORD TRUCK

Your Ford dealer invites you to try his New 1935 Ford V-8 demonstrator truck with your own loads . . . on your own routes . . . with your own driver at the wheel. Call him today and arrange for an "on-the-job" test.

THE ONLY TRUCK AT ANY PRICE THAT GIVES YOU ALL THESE FEATURES

NEW LOAD DISTRIBUTION for better braking and more uniform tire and brake wear. . . . NEW DRIVER COMFORT, driver's compartment completely lined, triple ventilation system, instruments grouped directly in front of driver. . . . NEW QUICK-STOPPING, RIB-COOLED BRAKES, longer life between adjustments, will not "ball-mouth" or "fade." . . . NEW CLUTCH, lower pedal pressure at idling speed, plate pressure increases by centrifugal force as engine speed increases, minimizing slippage. . . . NEW CRANKCASE VENTILATION reduces corrosion and oil dilution. . . . NEW COOLING EFFICIENCY, larger radiator, larger water pump impellers. . . . 80-HORSEPOWER V-8 TRUCK ENGINE uses no more fuel than a "four." . . . FULL-FLOATING REAR AXLE with straddle-mounted pinion. . . . FULL TORQUE-TUBE DRIVE permits free-shackling of semi-elliptic rear springs. . . . DEEP, RUGGED FRAME with no "kick-up." . . . LOW-COST ENGINE EXCHANGE PLAN saves time, saves money. . . . SKIRTED FENDERS in colors that match the hood and cab. . . . BAKED ENAMEL FINISH.

THERE'S one SURE way to find out whether a truck will do the job you expect of it. That's by testing it with your own loads, over your own routes, with your own driver at the wheel. Ford dealers have such complete confidence in V-8 Performance and V-8 Economy that they are ready and willing to place a 1935 Ford V-8 Truck at the disposal of any responsible contractor who wants to reduce his hauling costs.

Borrow your Ford dealer's demonstrator truck. Use it in place of one of your present units. Make your own tests of V-8 Performance and V-8 Economy. Consider the Ford Low-cost Engine Exchange Plan and other exchange privileges that assure welcome savings in maintenance costs. See how Ford has built into this new truck ALL the features needed for BOTH hauling and delivery service. Then look at the price! You will be convinced once and for all that the 1935 Ford V-8 Truck is now more than ever AMERICA'S GREAT TRUCK VALUE!

THE 1935 FORD V-8 TRUCK

1,218-Foot Bridge Erected by Georgia

(Continued from page 2)

inches wide at the bottom and 6 inches wide at the top was built between the roadway and the 6-foot sidewalk, which was 5 inches thick. There is a hand-rail of pre-cast concrete balusters and cast-in-place posts on both sides of the structure, except on the truss spans which have iron railing on one side and the concrete hand-rail on the sidewalk side. The posts measure 11 inches square and were poured with the rails in sets of panel forms. Before the forms were set and at the time that the curbs were cast, two supporting concrete blocks were set accurately and poured, being lined up by instrument so that the setting of the hand-rail forms would be simplified. This is a growing practice which benefits the appearance of the structure and the dispositions of the contractor and the engineers on the job. The trouble it saves is only known to those who have in the past tried to line up the outside of post forms with the attendant array of clamps and braces.

A very simple system of form clamps was used, consisting of heavy section 1-inch pipe with a movable foot that set up as soon as pressure was brought against it. At the top end was a fixed foot which could be turned up with a short-handled crank to tighten the hold of the clamp on the form. These Pony clamps were furnished by the Adjustable Clamp Co., of Chicago, Ill.

At each expansion joint, that is at every bent, there was an open joint 1½ inches wide through the entire superstructure. The deck had a 3 x 3 x ½-inch angle shop-bent to the crown of the roadway set at each end of the slab to prevent spalling of the concrete at the joint. The crown of the deck was 2 inches. At the expansion joints there were two of the standard posts of the same size, one on each side of the joint.

Each hand-rail was cast with an expansion joint at one end formed by a ¾-inch space left between one end of the hand-rail and the post at that end, with a 1-inch square stainless steel bar 18 inches long, with 10 inches in the post and 8 inches in the hand-rail, and with 6 inches of the bar in the post wrapped in tar paper in such a way as to leave room for 1½ inches of expansion.

Forms for Pouring Deck

The contractor developed a very satisfactory set of forms for pouring the deck. Panels of 1 x 6-inch faced lumber were made up to fit between the upper flanges of the I beams and these were supported by horses spaced about 2 feet apart. He used 4 x 6's 22 feet long attached to the four heavy I beams by a pair of J bolts at each stringer. There were nine of these for each panel or between bents and they were used to work from and also as bracing for the stringers before the diaphragms and deck were poured.

For finishing the under part of the deck and for stripping, the contractor used a traveling truss with underslung legs running on the rims of old automobile wheels on the deck and with the legs carrying planks across under the bridge for the workmen. When they desired to pass a bent all they had to do was to lift the cross planks by means of a tackle and run the truss beyond the bent, set up the under part again and start work.

The Three Piers

At No. 4 pier, on the east side of the Oconee River, the material was found to be too hard for the driving of foundation piles as had been planned and yet the material was not hard enough for holding the footing. Thus it was necessary to excavate to a depth of 23 feet to rock for the footing. The material could not be handled economically by a clam-shell bucket as it was too hard for that method of excavation.

Pier No. 5 in midstream was handled in a similar manner with no pile foundation, the excavation being carried on by hand to rock inside a steel sheet piling cofferdam of Lackawanna piling. When driving the sheet piling for this cofferdam, boulders interfered and prevented unwatering the coffer. It was sealed with a ring of lean cinder concrete 3 feet high and 2 feet wide and then excavated by hand in the dry. For unwatering the cofferdam a 3-inch Novo and a 6-inch Fairbanks-Morse pump were used. A derrick with a 40-foot boom and operated by a 2-drum hoist powered with a Hercules engine was used for handling all material on the river pier.

The pier footings were 12 feet 6 inches in diameter and No. 4 was 10 feet high, No. 5 was 7 feet 6 inches high, and No. 6 varied from 6 feet 6 inches to 10 feet 3 inches in height because of the slope of the rock at the site.

The pier shafts were battered ½ inch in 12 inches and the cut-water on the upstream side also battered 1 inch in 12 inches. The pier shafts were all 42 feet in height with No. 4 being 48 feet 9 inches in height. They were poured in seven lifts. The 15-inch vertical web wall was carried from the top of the footing to the cap for the stringers except that No. 4 was carried only to low water elevation. The main concrete caps on the piers measured 5 feet 6 inches wide and 2 feet 6 inches deep with a width of 30 feet. Piers No. 4 and 6 carried auxiliary caps for the approach span stringers and these caps measured 2 feet ⅝ inch high and 18 inches wide.

A Jaeger 7S mixer was used on the deck for pouring the hand-rail and sidewalk. Concrete for the deck was mixed at the central concrete plant and hauled to the structure at ground level in Blaw-Knox 1-yard roller-gate buckets by 1½-ton trucks. The buckets were lifted and swung to the deck by a Lorain 75 crane, which was previously used for handling the steel I beams from the ground and placing them on the caps. It also handled all reinforcing steel and lumber for the forms. It was 38 feet from ground level to the top of the finished deck. On the deck there were a foreman and six men placing the reinforcing in the slab, two men rolling con-

(Continued on page 24)

C. & E. M. Photo

The Central Mixing Plant, Seen from the Cement Shed

Pleasant Street, Danbury, Connecticut, Tarvia-built in 1915. Twenty years have brought many changes to this pleasant New England community, but the Tarvia road remains as smooth, easy-riding and skid-safe as the year it was built.

Hundreds of Tarvia roads like Pleasant Street, Danbury, offer proof that Tarvia "can take it." Built in the days when thirty miles an hour was considered reckless speeding, these smooth, easy-riding, skid-safe roads now provide completely satisfactory pavement for the modern high-speed, quick-stopping and quick-starting automobiles of today. Cost records will demonstrate how soundly economical they have been to build and maintain. Let the Tarvia field man tell you about them. Phone, wire or write our nearest office.

Barrett Tarvia
GOOD ROADS AT LOW COST

THE BARRETT COMPANY New York Chicago Philadelphia Birmingham St. Louis Minneapolis Cleveland Boston Detroit Baltimore Youngstown Cincinnati Buffalo Rochester Syracuse Bethlehem Providence Toledo Hartford Portland, Me. Lebanon Columbus Milwaukee In Canada: THE BARRETT COMPANY, LTD. Montreal Toronto Winnipeg Vancouver

A Portable A.C. Arc Welder of Motor-Generator Type

A new motor-generator-type welder, which takes 2-phase or 3-phase alternating current of standard voltages and frequencies and converts it into alternating current of lower voltage and at that higher frequency most suitable for arc welding with either heavily-coated or washed electrodes in all positions, has been announced by Lincoln Electric Co., Cleveland, Ohio.

The manufacturer claims the following advantages over the usual ac transformer type of welder: improved arc characteristics due to the higher frequency such as more stable arc, less magnetic blow, and easier starting of arc; improved weld metal since there is less spatter loss and in multiple pass welding there is greater density; and better power characteristics from the line. Since the machine takes power from all phases instead of from one phase, it eliminates unbalanced phases, giving a power factor approximately double that of the transformer type.

This new shield arc welder is built in portable and stationary ac motor-driven models in two sizes. The smaller capacity machine can be used for continuous welding with electrodes of 3/32-inch to 5/16-inch in size; the larger capacity welder handles electrodes from ⅛-inch to ⅜-inch in size. These machines are wired for 220, 440 or 550 volts, ac supply, 2 or 3 phase, 50 and 60 cycles.

Figuring Capacities of Vibrating Screens

In Bulletin 266-J, recently issued by Smith Engineering Works, 4014 No. Holton St., Milwaukee, Wis., appears a new table for figuring the capacities of vibrating screens. This subject is a complicated one and information on it has been badly needed for some time.

This table enables any user to figure capacities for any size of screen, for any number of decks, for wet and dry screening and with any percentage of undersize and oversize aggregate, and is applicable to any make of vibrator operating on the eccentric principle.

Copies of this new bulletin containing this table may be secured gratis from Smith Engineering Works by writing direct to the company and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Truck and Snow Plow Bought by Springfield

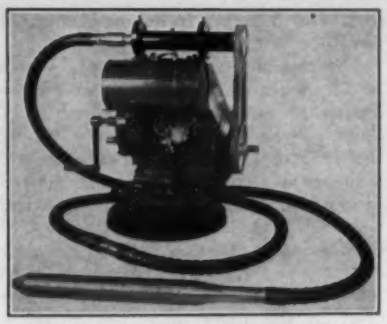
The City of Springfield, Mass., has recently added to its snow removal equipment an FWD truck and a Sargent V-type snow plow with wing. This equipment was purchased from M. B. Tyler Co., Inc., equipment distributor, in that city.

Good for Years of HARD SERVICE

A HAYWARD Bucket is an investment, not a gamble. It helps you make a profit on every job.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets



High-Speed Vibrator—V-Belt Drive

Self-Contained Vibrators Gas or Electric Powered

Two new concrete vibrators which are self-contained, fully enclosed, and give from 3,800 to 4,000 pulsations per minute have been announced by Superior Construction Equipment Co. of Indiana, Inc., 1836-1860 So. Kostner Ave., Chicago, Ill. Model M-1 has a 2-hp Lauson engine, mounted on a free swiveling base, with a 2⅜-inch diameter vibrator while Model M-2 has a 4-hp Lauson engine and wheelbarrow mounting with a 12-inch x 3.50 single pneumatic tire, and a 3½-inch diameter vibrator. They may be equipped with electric motors.

The rotors are carried by ball bearings and are driven from the engine by flexible steel shafts, encased in moulded rubber hose with an internal spiral steel bearing and full external steel armour. New features in these vibrators are the reduced speed of the engine and the higher vibration rate obtained through a V-belt speed step-up and ball bearing belt-adjusting counter shaft. The couplings on driving shafts and outer casings are threaded to eliminate slip. The machines are supplied with a 14-foot flexible drive, with optional additional sections up to 21 to 28 feet.

HVASS

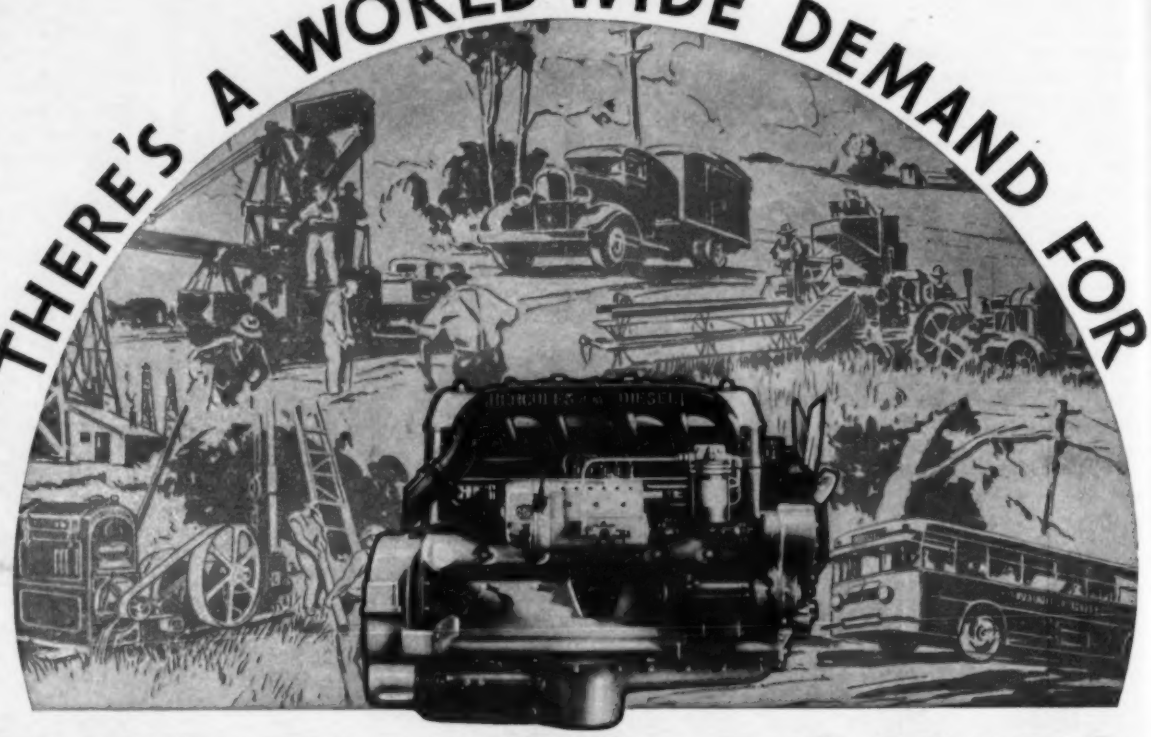
HEAVY-DUTY TRAILERS
SAND SPREADERS
CHIP SPREADERS
SWEEPERS
SPRINKLERS
HEATING KETTLES

"HVASS" Type 100-D Bituminous Distributor

Manufactured by

Chas. Hvass & Co., Inc., 508 East 19th St., New York City, N. Y.

THERE'S A WORLD-WIDE DEMAND FOR



HERCULES POWER

Hercules power has earned its world-wide reputation through years of dependable service in every corner of the globe. Hercules engines and power units, both gasoline and Diesel, are harvesting wheat in the Argentine, operating shovels in South African mines, building roads in Persia, moving tons of freight and millions of passengers in trucks and buses on the highways of the world. Hercules places at the command of industry everywhere an engineering organization long-experienced and expert in planning power applications of every description — a service which includes the study of specialized power requirements, the designing and building of equipment to meet the varied needs of modern commerce.

HERCULES ENGINES

Hercules
Motors Corporation
Canton, Ohio

AMERICA'S FOREMOST ENGINE MANUFACTURER
POWER PLANTS FROM 4 TO 200 H.P.
Hercules power is standard on over sixty types of machinery including all kinds of road building and maintenance equipment

Bombing Blast Holes at Golden Gate

(Continued from page 2)

points. They were provided with automatic detonators timed to explode one minute and twenty seconds after lighting the fuse, which was done just before dropping a spud. Thus the explosion took place after the bomb had been driven into the serpentine. The time interval was determined by experiment to obtain the most effective results.

The effect of the explosion was to spring a hole about 18 inches in diameter and 1½ or 2 feet into the serpentine. This hole was deepened by successive impacts of the spud with additional bombs. Usually about twelve small bombs were necessary on the average to make a blast hole 20 feet deep.

The Blasting Tube

A blasting tube 14 inches outside diameter with a casing ½-inch thick and 120 feet in length insured the dropping of the successive pilot bombs in a true vertical position in the deep water at the site. In order to prevent damage to the blasting tube by the pilot bomb explosions, the foot of the blasting tube was raised about 4 feet above the ground by a pair of steel legs made of 12-inch x 10-inch H-beams and spanning about 8 feet. The tube and the supporting legs were of welded construction. Considerable experimenting was necessary before the most suitable proportions were found. The heavy ½-inch casing was necessary to furnish the required strength to the long slender blasting tube against lateral bending due to the pressure of the currents.

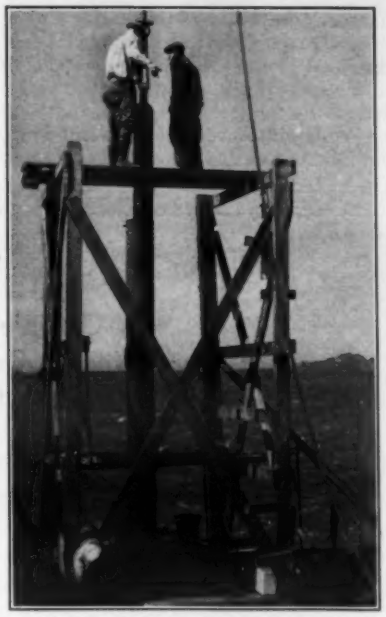
The blasting tube was held in position on the bow of the Ajax while its feet stood on the bottom. A portable scaffold tower on the Ajax bow furnished access to the section of the blasting tube where the bombs in the spud were ignited before dropping to the bottom. The facility with which all blasting operations were carried out with this equipment amply justified the selection of this method in preference to drilling.

The water at the site is exceedingly rough, and the ebb tide has occasional velocities as high as 6 knots. Any attempt to loosen the rock by drilling and blasting would have necessitated a separate drilling frame for each drill resting on the ground to prevent breakage of tools by the pitching of the drill barge. The holes obtained would have been small and difficult to load and much more mechanism would have been necessary than in the method adopted, and also much more time would have been consumed in drilling.

The Large Bomb

After the completion of a blast hole, large bombs made of 8-inch pipe and loaded with 100 to 350 pounds of 60 per cent dynamite were driven into the blast holes. These bombs had points formed by cutting the sides of the pipe into gores, bending the gores and welding them together into a point about 6 inches long. The cartridges of dynamite were packed in and the voids between them filled with dry cement, about one sack being required for each bomb. On

(Continued on page 19)



Portable Scaffold Tower on Bow of Derrick Barge Ajax

New Blasting Material Water-Resistant, Safe

A new blasting material, which is claimed to be absolutely water-resistant and which can not be detonated by the usual methods, thus making it especially safe for transportation and storage, was announced at the Eighteenth Annual Technical Section Convention of the Explosives Department of the du Pont Co., at Wilmington, Dela.

This new product, to be known as Nitramon, can not be detonated by the strongest commercial blasting cap, by impact, flame, nor shooting a rifle bullet into it. In actual use it is exploded by means of a large diameter cartridge of dynamite. It is non-headache producing and is rendered water-resistant by being sealed up tightly in a tin can.

Nitramon, which is designed for use in quarries and such blasting operations as stripping, will be marketed only in large diameters, 4-inch, 4½-inch, 5-inch and 7-inch sizes.

2" Self-Priming Centrifugal Pump

Easily carried by one man; 100% automatic
No handles or petcocks to be adjusted
Four-cycle engine with oil reservoir in crankcase
Easy to start—Speed control—Air cleaner
Foot and rope starters—self-oiling. Engine has only one place requiring lubrication.

Ask for Specification Sheet 20A

Marlow Pumps, Ridgewood, N.J.

CONSTRUCTION EQUIPMENT

McKIERNAN-TERRY
Pile Hammers, Pile Extractors

LAMBERT-NATIONAL
Hoists, Derricks, Cableways and Whirlers

STEELE & CONDICT
Special Machinery, Movable Bridge Machinery

Write for descriptive catalogs

McKiernan-Terry Corp.
19 Park Row, New York
Distributors in Principal Cities

LET'S HAVE A SHOW-DOWN

The SHOW-DOWN is an opportunity for you to learn for yourself what the "Caterpillar" Diesel Tractor can do for you on your own operations. Check power, easy handling, sure traction. Figure savings in its rock-bottom operating costs—up to 75 and 80% on fuel alone! Call a dealer—he'll arrange a personal SHOW-DOWN for you any time—confirmed by the performance records of over 5000 "Caterpillar" Diesels now at work. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

At a fuel cost of only 12½ cents per hour, this "Caterpillar" Diesel Seventy-Five Tractor is moving earth on a road construction job near Ashdown, Arkansas.

Smooth Running Job on Louisiana Levee

(Continued from page 10)

and have little binding value while the grass roots form a well-knit mat.

The Crawler Outfit

Working about a mile north of the Monighan was a crawler outfit operated by C. W. Greeson, who is a part of the Providence Construction Co. In cleaning up this section he used seven Model L Allis-Chalmers tractors hauling three Trackson, three Western and one Allis-Chalmers 12-yard crawler wagons. An Allis-Chalmers Model 35 tractor with a Wooldridge bulldozer was used in dressing the slopes.

The average haul on this section was about 1,100 feet, somewhat longer than is customary for this equipment. It was necessary, however, as the engineers required a landside borrow pit as the material on the riverside was not of good quality.

For loading the crawler wagons Greeson used a 45B Bucyrus-Erie dragline with a 3-yard Page bucket. Gas tanks on skids were pulled out over the job so that there was no chance for any machine to be without gasoline for a moment through oversight in fueling at the appointed times.

Four Kohler 1,500-watt lighting plants were distributed over the work. Three of the plants were out on the levees, one was used to provide light for the shop, and they were equipped with 1,500-watt lights. One of these units mounted on a steel tower very much like an airway beacon could light up about 1,500 feet of levee. The tractors had a little trouble driving against the powerful floodlight so other lights had to be provided to offset the glare as the tractors carried no lights.

During the height of the work the Providence Construction Co. had an organization of 450 men on the payroll. This included about 200 men for clearing and grubbing. The maximum number of tractors on the work at any one time was thirty-six.

Personnel

The Providence Construction Co. of Lake Providence, La., was composed of the following formerly independent contracting organizations formed in much the same manner as the Six Companies, Inc., builders of Hoover Dam: Horton & Price Construction Co., C. W. Greeson, J. H. Morrow, Council & Lewy, and Harris & Brandenburg. For Horton & Price Construction Co. on this work H. S. Price was Superintendent while L. A. Price, President, was active in directing the entire project. The work was under the direction of the U. S. Engineer Office, 2nd New Orleans District, Lieut. Col. J. N. Hodges, District Engineer, with F. C. Davis, Junior Engineer, as Resident Engineer, and T. Friedman, Junior Engineer, as Resident Inspector.

Selecting and Specifying Lumber for Construction

Filling a long-felt want for a complete guide for the selection and specification of grades, species and sizes of lumber, the Lumber Grade-Use Guide, recently published by the National Lumber Manufacturers Association, is the result of ten years' study and research by the technical staffs.

Printed in convenient loose-leaf form, the Manual enables any lumber user to determine readily the specie and grade of wood best suited to his purpose. Copies of this guide may be obtained from the National Lumber Manufacturers Association, 1337 Connecticut Avenue, Washington, D.C., at a cost of $1.50.

CMC Has What it Takes!

- A Complete Line To Pick From
- Modern Design — Lower Prices

Investigate

Wonder Tilting Mixers, Hoists, Pumps, Wheel Barrows, Master & Silverstreak Drum Type Mixers, Saw Rigs, Plaster and Mortar Mixers, Concrete Carts.

Write For Free Descriptive Bulletins

CONSTRUCTION MACHINERY COMPANY
500 Glenwood St., Waterloo, Ia.

South Bend

Bituminous Pressure Distributors
Street Flushers
Street Sprinklers

Literature and prices on request

MUNICIPAL SUPPLY COMPANY
SOUTH BEND, INDIANA

A DIESEL POWERED TRACTOR that will...

...start instantly
Simplified electric starting puts you "on the job" at the turn of a switch.

...stay on the job
6 cylinder engine eliminates vibration and reduces maintenance time and cost.

...speed your work
Ample power and Cletrac differential steering enable you to work faster.

...operate economically
In operation thousands of hours, the 40 has set new economy records.

40 DIESEL

THE features which make Cletrac gasoline tractors so successful are incorporated in the Diesel 40 . . the only medium power tractor with 6 cylinder Diesel engine and electric starter. Write for specifications.

THE CLEVELAND TRACTOR COMPANY
Cleveland, Ohio

CLETRAC CRAWLER TRACTORS

Rock, Earth, Muck Licked by Lane

(Continued from page 5)

an I-R 370-foot portable compressor driven by a Waukesha full-diesel engine. An I-R 8 x 10 220-foot compressor supplied air for the shop for sharpening steel. A flat roof covered with tarpaulin was erected to cover the I-R oil furnace and the pneumatic sharpener. The blacksmith showed ingenuity in the use of a portable horse on which the short steel rested when heating in the furnace. Two permanent horses, each topped with a steel reinforcing rod, were erected in front of the sharpener to facilitate the handling of short steel from the near horse and longer steel from the other. This outfit handled between 170 and 180 drill steels per day for both the wagon drill and the jack hammers used in this cut. Atlas 40 per cent and 60 per cent dynamite was used for blasting in the rock cuts.

On heavy hauling of excavation, particularly in the rock cut and on earth excavation where the Carry-All was not employed, a Caterpillar Fifty diesel tractor with an 8-yard LaPlant-Choate crawler wagon and an Allis-Chalmers 75 with a similar wagon were used, supplemented occasionally on long hauls by a few heavy-duty trucks.

Typical Bridge Construction

Typical of the five bridges constructed on this project is the 20-foot structure at Sta. 154 shown in the illustration on page 36. When the footings were excavated and poured, instead of the usual row of sand bags to form a dam around the footing, the contractor used rough lumber filled in with dirt and held together with tie wires. The main portion of this temporary dam was erected at about mid-stream and after one footing had been completed, it was only necessary to turn the ends of the dam toward the other side and proceed with the excavation, form construction and pouring of the second footing.

On these bridges Bosco clamps were used on the forms instead of wire ties. The Class B concrete for the footings was mixed in a Jaeger 2-bag mixer, using 10 gallons of water with only a 1-inch slump.

Penetration Macadam

This entire job was 33,152 feet long and upon completion of some of the grading about July 1, the spreading of the base course of trap rock was started. The base course was 20½ feet wide and 6 inches deep on which the surface course of bituminous macadam, 20 feet wide and 2½ inches deep, was spread and penetrated.

Labor

Inasmuch as this contract was an NRH project, the contractor was required to operate with labor working not more than 30 hours a week. This was handled by working the complete crew 10 hours a day Thursday, Friday and Saturday of one week and Monday, Tuesday and Wednesday of the following week, when it was succeeded by an entirely new labor organization for six working days.

Lubrication

Two greasers working alternate days made the rounds of all equipment, except the steam shovels, each day and, assisted by the machine operator and using a hand-operated Alemite pressure gun and lubricant, saw that every part needing greasing was taken care of. If any damage or needed adjustment was noted, it was immediately reported to the Superintendent. On the shovels the shovel runner and foreman or oiler attended to the daily greasing.

(Continued on page 20)

White Trucks for 1935

With every third motor truck on the road more than six years old, manufacturers expect a tremendous replacement market in 1935. The White Motor Co., Cleveland, Ohio, has recently announced a complete line of streamline trucks improving the 700 series with Models 701 and 702 in the low-price field. The 1935 models meet gross weight requirements from 8,000 pounds to 60,000 pounds, including tractor and six-wheel units.

Models 730 and 731 in the 26,000 to 30,000 pounds class have 12-cylinder "pancake" engines achieving underslung power and moving the cab to the extreme front of the truck to provide maximum payload space.

Road Maintenance Costs

Progressive states and counties now keep itemized road upkeep cost figures that they may know how each dollar is allocated for surface repair, weed cutting, snow removal, etc. This record, together with traffic counts, enables the states to determine the cost of road upkeep per vehicle for each type of surface.

Records of this type become more valuable each year in determining the economy of various kinds of pavements for future construction.

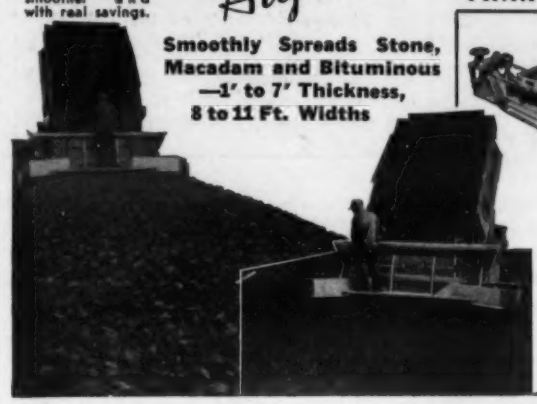
—From "Concrete and Cement Reference Book"

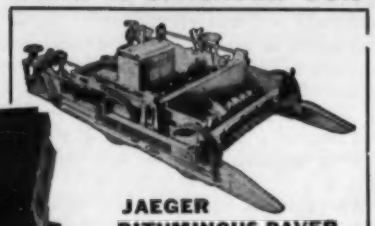
JAEGER *Adjustable* SPREADER

COSTS NO MORE THAN A SPREADER BOX

Lays low cost roads, faster, smoother and with real savings.

Smoothly Spreads Stone, Macadam and Bituminous —1" to 7" Thickness, 8 to 11 Ft. Widths





JAEGER BITUMINOUS PAVER

power-driven, adjustable 9 to 15 ft., does precision job without forms. Write for details.

THE JAEGER MACHINE COMPANY

701 Dublin Ave., Columbus, Ohio

DOUBLE GRADERS MOTOR DRIVE

Galion's desire to develop the Motor Grader to the limit of its possibilities brought out the Double Drive feature... Double Drive . . . means better ability to handle heavy maintenance work at greater speed than possible with two-wheel equipment. Hence, better grader performance.

Double Drive on Galion Motor Graders is worthwhile. It provides positive traction under all working conditions . . . all four or eight wheels having full flexibility, with each wheel always in full driving contact.

The center drive is geared to each set of wheels, which insures full oscillation, and permits the wheels to freely follow ground irregularities and pass over obstacles.

The entire assembly is mounted on roller bearings, giving smooth operation with power losses reduced to a minimum.

We would like to tell you more about Galion Double Drive Motor Graders and what they can do for you.

With the use of dual tires as illustrated above, the full effect and power of eight driving wheels is obtained.

Illustrating the flexible operation of the driving wheels in the Galion Double Drive. All four wheels make contact under any condition of travel.

The GALION Iron Works & Mfg. Co. Galion . . . Ohio

Local Material, Asphalt for Surfacing Roads

(Continued from page 1)

bring the bitumen content to approximately 5.5 per cent by weight. The mixing process was the same as for any top mat. The material was then smoothed out and spread over the 22-foot width in three operations or layers, in order to allow traffic to compact them separately. After the last distribution of surface material, the entire section was shaped with a 12-foot grader to insure a smooth surface and uniform crown.

Attention is called to the fact that with the exception of the liquid asphalt, no materials were used other than those which were present in the grade itself.

This is an economy and accounts largely for the low cost of this type of construction.

Costs

The completion of this experimental section cost $10,885.80 or $2,474.04 per mile. Liquid asphalt was used at the average rate of 2.6 gallons per square yard. The cost includes labor, materials and a rental charge on equipment as well as the cost of reshaping and replacing the original grade. The resulting surface is smooth, dustless and, while it is yet comparatively new and maintenance costs of any value are not available, it is believed that this road will render satisfactory service at reasonably economical maintenance costs.

Streamline Engine Oil

A light lubricating oil which flows freely during frigid winter weather and yet maintains its body under high temperatures has recently been developed by the Standard Oil Co. of Indiana, 910 So. Michigan Ave., Chicago, Ill. This oil is the result of years of laboratory experimentation and research, in which a new refining process, propane dewaxing, plays an important part.

Before it was discovered and applied to this use, propane was burned as a refinery gas. By applying about 150 pounds per square inch pressure propane is now transformed from a gas to a liquid only half as heavy as water and resembling liquid air in many ways. When wax-bearing oil is dissolved in this extremely fluid liquid and the pressure is gradually reduced, part of the propane boils away, automatically refrigerating the solution down to 40 degrees below zero. At this point the wax solidifies into crystals which can be filtered out. A Chlorex treatment then follows, removing from the oil all undesirable elements. The combination of propane dewaxing and Chlorex extraction results in the lighter oils which flow at frigid temperatures, which do not break up when heated, and which are free of sludge-forming material, giving greater driving ease and lower operating costs.

Contractor's Purchases for Colorado Aqueduct

Contractors on the Metropolitan Water District, Colorado River Aqueduct are pushing their work in a most energetic manner. Within a short time after the award of the contract, the Thompson-Starrett Co. placed its initial orders with Smith Booth Usher Co., Los Angeles, Calif., for nine side-discharge Jaeger truck mixers to furnish concrete for the canal lining. The J. F. Shea Co. also purchased a fleet of these mixers for its work.

While the truck mixers are of special design, they follow the general practice of the new types developed. They are of 4-cubic yard capacity, driven by a separate gasoline engine and mounted on pneumatic-tired trailers. The mixers are charged at a central batching plant and then mix the concrete en route to the canal site. They discharge over the side of the trailer into troughs direct to the forms.

One of the Trailer-Mounted Mixers Used by Thompson-Starrett on the Colorado Aqueduct Project

The Thompson-Starrett Co. has also purchased a fleet of Highway trailers from Smith Booth Usher Co. on which the mixers were mounted at the factory. The trailers and mixers were driven across country to the job. Thompson-Starrett is building approximately 16½ miles of conduit and 1¼ miles of siphons on the Colorado River Aqueduct. The J. F. Shea Co. has 6 miles of conduit and ½-mile of siphons in addition to its tunnel work.

New Loadmaster Distributor

Herbert S. Freeman, 49 Darwin St., Rochester, N.Y., has been appointed distributor for Loadmaster cranes for the western portion of New York State by the Bucyrus-Erie Co., of South Milwaukee, Wis., manufacturer of Loadmasters.

Education of employees is no doubt the prime factor in accident prevention but this should follow the proper protection of employees against the existing hazards.

GET More THAN

These are the facts that determine Economical Tractor Operation..

✓ LOW FUEL COST
✓ LOWER ORIGINAL COST
✓ LOWER MAINTENANCE
✓ LESS DEPRECIATION

THESE are the four big factors in cutting tractor costs. To get one at the expense of the others is no economy. Don't be misled ... before you buy any tractor, find out about lay-ups for repairs ... and condition of the tractor when the job is finished. A-C Oil Tractors operate with less maintenance cost because internal pressures are less than one-third those of the compression type. A-C Oil Tractors are ready to compete on fuel costs and all other costs. Buy the tractor that gives you LOWEST FINAL COST.

Above—The Model "L-O" Oil Tractor 76 Drawbar H.P.

Below—The Model "K-O" Oil Tractor 48 Drawbar H.P.

A-C OIL TRACTORS GIVE LOWEST FINAL COST!

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U. S. A.

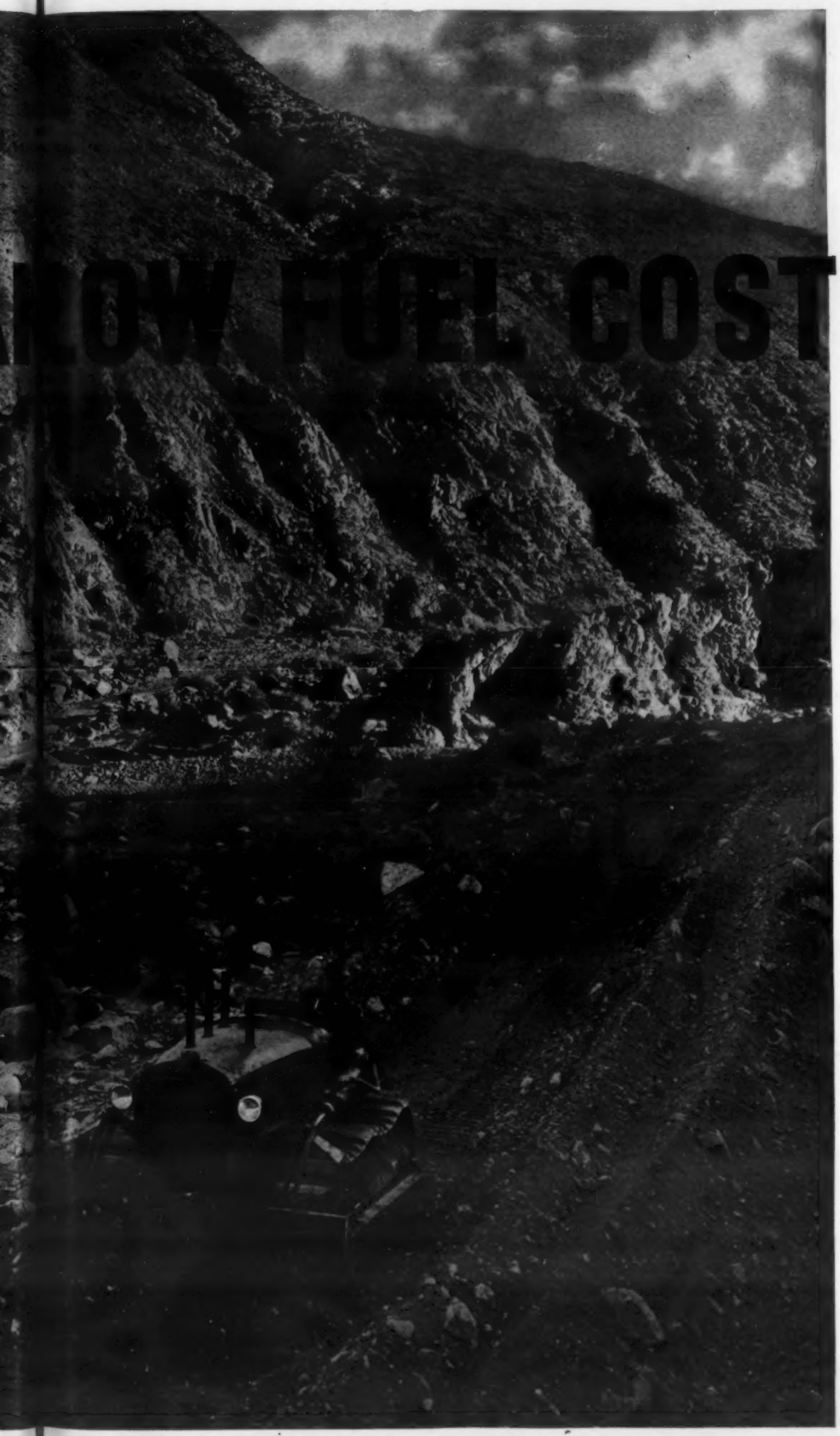
Compressor, Welder, Pump Run by Power Take-Off On Contractor's Truck

Three pieces of equipment used almost constantly by contractors may be mounted on a 1½-ton truck and operated individually or at the same time by a split-shaft power take-off. The Redi-Service truck furnished by Ditwiler Mfg. Co., Galion, Ohio, to a mid-west contractor carries a 150-cubic foot displacement air compressor, a 300-ampere electric arc welder, and a 2-inch centrifugal pump, all operated directly by the truck motor through a Ditwiler split-shaft power take-off.

The body is an all-steel welded unit built so that there is ample room to carry men, tools, and equipment, and provides rapid transportation of equipment and men to any part of a job or to widely separated small jobs.

The engine of the Chevrolet truck is equipped with a governor control which limits the speedometer speed of the truck to about 25 miles per hour, which is correct for the operation of the equipment. The motor is also equipped with an air-operated automatic throttle control, which can be adjusted as desired to control the operation of the air compressor. A special radiator with 25 per cent greater cooling capacity is recommended to protect the motor from heat.

The Redi-Service Truck



● Building a pioneer road for trucking aggregate . . . Fargoe Tunnel section, Metropolitan Aqueduct project in Southern California. "L-O" Oil Tractors are doing this job at Lowest Final Cost.

Bombing Blast Holes at Golden Gate

(Continued from page 15)

top of this 18 inches of concrete of about 1:3:3 proportions was placed for tamping the charge. The size of the charge was determined by the blasting effect desired, smaller bombs being used near the slopes and bottom of the excavation and larger bombs toward the center of the excavation. The pipes were made 22 feet long for a blast hole 20 feet deep, and were driven into the holes with a cable tool follower 9 inches in diameter and weighing 2½ tons. This follower had a square shoulder for driving on the end of the pipe and a sharp pilot point for entering the pipe. Within each pipe the blasting wire connecting with the charge was coiled and after driving the pipe, a diver brought the end of this wire to the deck of the barge where it was connected to a battery.

The same blasting tube used to guide the pilot bomb was used to guide the large bomb into the hole and served as a guide for the cable driving tool. Several large bombs were usually fired together. At such times the blasting tube was hoisted up completely by the Ajax and the barge was shifted several hundred feet toward the east.

Transit Control Station

The blasting operations required a transit control station at the end of the access trestle, and instrument men were kept there 24 hours a day. The positions of the blasting tube were located by chain and slope angle and immediately plotted on a blasting diagram while the elevation at which the charge was placed was observed from the deck of the Ajax by sounding with the spud cable. The slopes obtained were as steep as could be obtained with similar excavations conducted in the open.

Excavation

The excavation of the material was done by the barge Ajax with a 4½-yard Williams clamshell bucket, the bowl and teeth having been built specially from designs by the contractor. It was found that there was much breakage of teeth, and a standby bucket was necessary so that one might undergo repairs without holding up the job. The spare bucket was a 3-yard Owen with special teeth. Both buckets gave excellent service, considering the punishing type of work. The excavated material was deposited in a 500-yard dump barge and towed out for disposal in deep water.

The blasting and excavation was under the direction of Jack Graham, General Superintendent, Pacific Bridge Co., San Francisco, Calif., contractor for the pier.

Expansion Anchor Bolts for Bonding Concrete

The usual method for repairing concrete roads is to chip out the disintegrated concrete, dig back under the edges about 1 foot deep and 1 foot under and then pack the new concrete under the old. This requires about 15 to 18 inches of concrete in each new section. Expansion hook bolts made by the American Expansion Bolt & Mfg. Co., 108-128 No. Jefferson St., Chicago, Ill., eliminate the need to use extra concrete.

For repair work 90-degree-bend expansion anchors, 1, ⅝ or ¾ x 11 inches and with a 4-inch bend are set 4 inches deep on 2-inch centers in the edge of the old concrete. The time required for drilling the holes with an air hammer is less than one minute per hole. Lead slugs and swedging units make up the assembly which insures a strong permanent bond between the old and the new concrete.

Rock, Earth, Muck Licked by Lane

(Continued from page 17)

Quantities and Unit Prices

Some of the more important items with quantities and unit prices are listed below:

Item	Quantity	Unit Price
Earth excavation	156,551 cubic yards	$ .55
Rock excavation	50,000 cubic yards	.55
Unclassified excavation	1,475 cubic yards	1.50
Trench excavation	3,926 cubic yards	1.00
Borrow excavation	55,367 cubic yards	.15
Formation of subgrade	79,896 square yards	.10
Shaping slopes and shoulders	33,080 linear feet	.10
Gravel fill subbase	32,500 cubic yards	.40
Broken stone for base	30,760 tons	1.25
Broken stone for bituminous macadam	12,548 tons	1.55
Bituminous material applied	199,740 gallons	.12
Class A concrete 1:2:4	193 cubic yards	12.00
Class B concrete 1:3:5	1,534 cubic yards	10.00
Deformed reinforcing steel bars	22,032 pounds	.04
18-inch reinforced concrete pipe in place	1,806 linear feet	1.50
24-inch reinforced concrete pipe in place	772 linear feet	2.50
30-inch reinforced concrete pipe in place	232 linear feet	3.50
48-inch reinforced concrete pipe in place	236 linear feet	7.50
Vitrified tile underdrain	5,096 feet	1.00
Vitrified tile outlets	385 linear feet	.35
Concrete bridge rail	199 linear feet	7.00
Wire rope railing	20,622 linear feet	.30
Muck excavation	29,213 cubic yards	.10
Total Bid		$277,863.75

Equipment Used

1 1-bag Jaeger mixer
1 2-bag Jaeger mixer
1 ⅝-yard Bucyrus-Erie steam shovel
1 ⅞-yard Bucyrus-Erie steam shovel
1 ⅝-yard Insley gas shovel
2 10-ton Buffalo-Springfield steam rollers
1 220-foot Ingersoll-Rand portable compressor
1 370-foot Ingersoll-Rand portable diesel compressor
2 Caterpillar Thirty tractors
1 Caterpillar diesel Fifty
1 Caterpillar diesel Seventy-Five
1 Cletrac tractor with bulldozer
1 Allis-Chalmers Model K with bulldozer
1 Allis-Chalmers Model L tractor
1 Le Tourneau Carry-All scraper
1 P & H crane on a Mack truck used for breaking concrete of old road with 1,500-pound skull cracker (467 cubic yards of concrete broken by this method)
2 Linn tractors
1 P & H 1½-yard gas shovel
1 P & H 1-yard gas shovel
3 Barnes triplex pumps
1 Humdinger contractors' pump
1 Barnes diaphragm pump

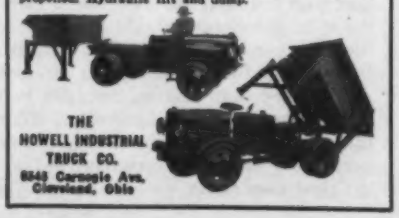
C. & E. M. Photo

The Daily Routine Lubrication of Power Equipment

Personnel

This 6.5-mile grading and penetration macadam project is immediately to the east of the concrete paving and concrete pipe line contract executed by C. W. Blakeslee & Sons at North Branford, Conn., and described in detail in the December, 1930, issue of CONTRACTORS AND ENGINEERS MONTHLY on pages 49-54. For the Lane Construction Co., of Meriden, Conn., on Project NRH 59C, E. A. Pixley was Superintendent and M. B. Pearce was Resident Engineer for the Connecticut State Highway Department.

For Low-cost Handling of Loose Materials
Type 27 Lift-Dump Truck
Patented
One truck serves several inexpensive Skid-Dump Bodies. Design of body to suit conditions. For hand, chute, or power loading. Cap. 2 yards. Standard transmission, or 2-speed forward, 2-speed reverse, optional. Gasoline propelled. Hydraulic lift and dump.



THE HOWELL INDUSTRIAL TRUCK CO.
8542 Carnegie Ave.
Cleveland, Ohio

Picks and Shovels

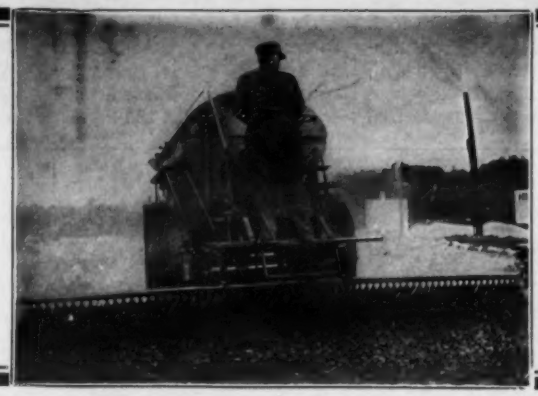
(Continued from page 1)

sarelli. Quickly and methodically he went to work, while the boss stood by, directing operations. An inch at a time, he removed the dirt under which the worker was buried.

"Be careful or you'll hurt him," shouted the on-lookers. But Passarelli knew what he was about. Deftly he worked the levers of the great machine and inch by inch the dirt was removed. Finally the worker's hat appeared and in jumped the men and yanked him out.

And thus another life was added to the list of five men whose lives Passarelli has saved during the past four years by means of his shovel.

When interviewed by a staff writer of the New York *World Telegram*, in which this story appeared, Passarelli merely replied "Me, I've been running a shovel ten years. I try to be good so I can keep my job. I just do the best I can."



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are faster—handle more loads per day—and apply bitumen at any width up to 20 feet, as illustrated.
Any contractor who is in business to make money should write for a copy of Bulletin A-1935. Address:
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517 Finance Bldg. KANSAS CITY, MO.
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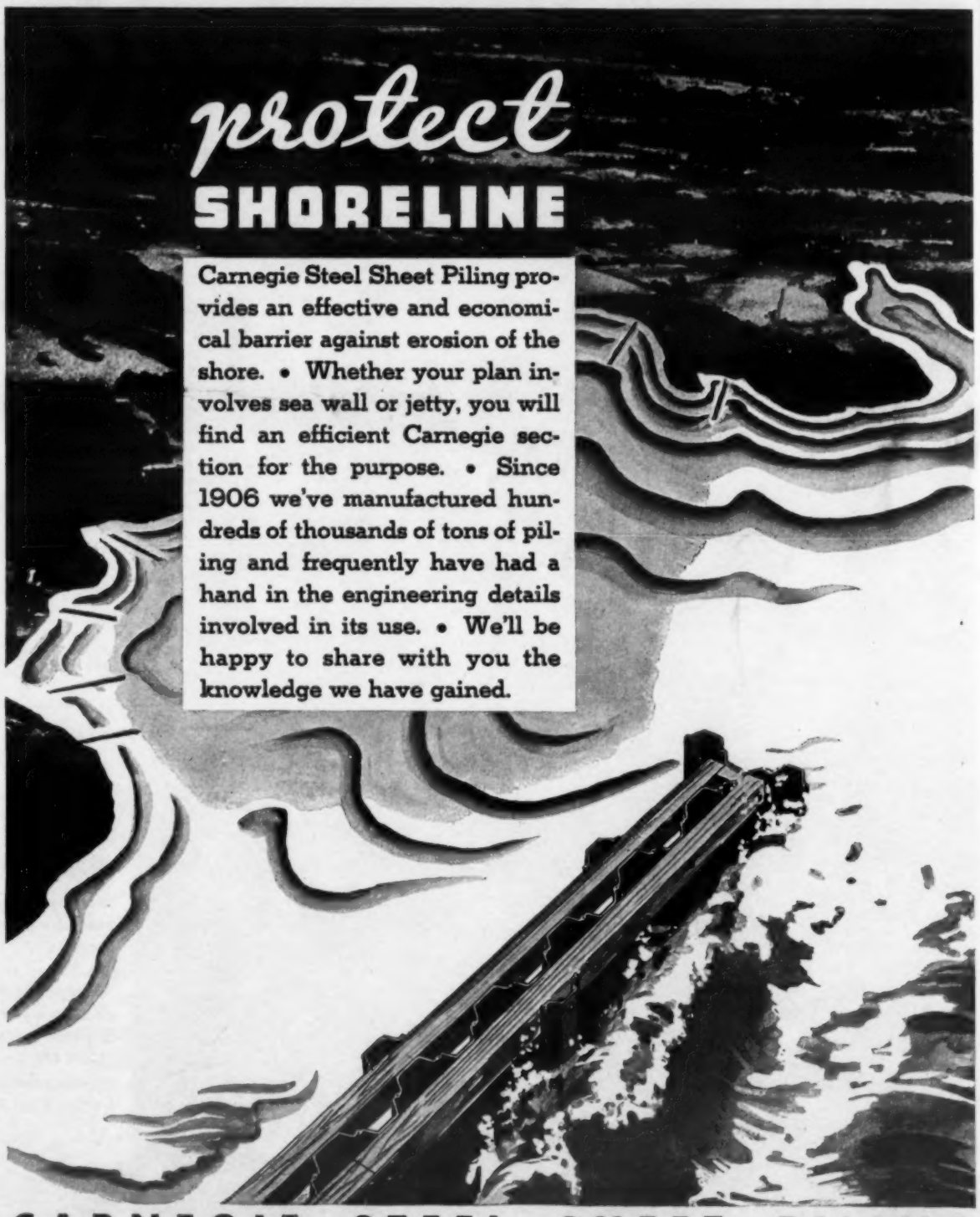
Carnegie Steel Sheet Piling provides an effective and economical barrier against erosion of the shore. • Whether your plan involves sea wall or jetty, you will find an efficient Carnegie section for the purpose. • Since 1906 we've manufactured hundreds of thousands of tons of piling and frequently have had a hand in the engineering details involved in its use. • We'll be happy to share with you the knowledge we have gained.



CARNEGIE STEEL SHEET PILING
Product of CARNEGIE STEEL COMPANY, *Pittsburgh, Pa.*
and ILLINOIS STEEL COMPANY, *Chicago, Ill.*
United States Steel Corporation Subsidiaries

A Sterling Single-Stage Jetting Pump with Waukesha Motor Delivering Water Through 2-Inch Pipe

Single-Stage Pumps Prove Effective Workers

A single-stage high-pressure centrifugal pump with the effectiveness of a multi-stage unit and especially adapted for jetting on pile-driving jobs, hydraulicing, river bank washing, and for use as a mud pump on well drilling operations has been developed by the Sterling Machinery Corp., 411-13 Southwest Blvd., Kansas City, Mo. Addison Miller, Inc., of Saint Paul, Minn., replaced a three-stage pump and 120-hp engine on pile driving at Rulo, Nebr., with a Sterling single-stage jetting pump direct-connected to a 50 to 70-hp Waukesha gasoline engine power unit and reduced the gasoline consumption two-thirds.

Sterling single-stage high pressure centrifugal pumps are simple in construction, have few wearing parts, and these are made heavy so as to be adaptable for the hard service required on construction work, and are designed to withstand the abrasive action of material in the water being pumped. Other well-known Sterling products are self-priming pumps ranging in sizes from 2 to 8-inch, sand and gravel dredging pumps, multi-stage pumping units, hoists and saw rigs and electric generating plants.

Integral Curing Tests With Calcium Chloride

A report upon a study of the effect of calcium chloride integral curing on cements of widely varying compositions, as well as concrete, conducted during the past two years under a fellowship of the U.S. Bureau of Standards, was made by Paul Rapp, in charge of the study, at the meeting of the Highway Research Board in Washington, D.C., in December. The studies indicate that strengths computed to be contributed by the two silicate compounds in cement were increased and the strength computed to be contributed by tricalcium aluminate was decreased by the addition of calcium chloride. Calcium chloride decreased the time of the set of eleven commercial cements and increased the flow of concrete mix and the strength of the resulting concrete. The physical properties of all the cements were similarly affected by the addition of calcium chloride. Plastic mortar strength tests at three curing temperatures indicated that 1.3 to 2 per cent calcium chloride should be used integrally "according to the rate of set of the concrete."

The studies further showed that the addition of calcium chloride appears to increase somewhat the heat contributed at the end of 24 hours by dicalcium silicate and tetra-calcium ferro-aluminate and to decrease the heat from tri-calcium aluminate present in cements. The heat contributed by tri-calcium silicate shows very little change when calcium chloride is added. Calcium chloride increases the rate at which the heat is evolved from all cements and in general gives an increase of about 4 calories per gram of cement at 24 hours.

CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including Bridge deck slabs, Dams and Locks, Highway pavement and Concrete products.

Write for circulars and engineering data.

MUNSELL CONCRETE VIBRATORS

907 West Side Ave. Jersey City, N. J.

STONE AND GRAVEL CRUSHERS

A combination jaw crusher and roll crusher gravel plant with capacity of 500 to 1500 yards 1-inch material daily depending on the amount of oversize.

CRUSHING, SCREENING AND LOADING PLANTS FOR EVERY JOB

Contractors, counties, states and municipalities everywhere are producing crushed stone and gravel with UNIVERSAL equipment.
A complete line of sizes in many portable combinations built for quality, dependability and economy.
The original overhead eccentric type crusher backed by 28 years of manufacturing and designing skill.

Send details regarding your problem and ask for catalog

UNIVERSAL CRUSHER CO., 620 C Avenue, West, Cedar Rapids, Iowa

LINK-BELT SHOVEL NEWS

for Contractors, Road Builders and Engineers

Recovering Placer Gold from Colorado's Famous Clear Creek

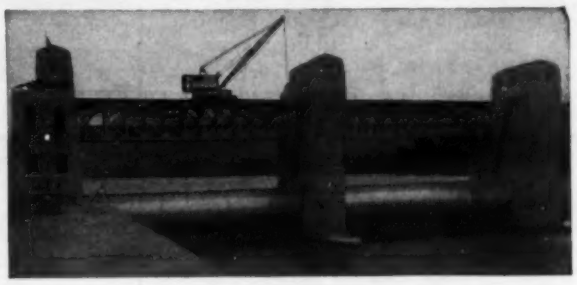
The prospector of old who "panned" the streams of Colorado for "pay-dirt" is being considerably outdone by this modern placer gold recovery equipment. It is owned and operated by Humphreys Gold Corp. on Clear Creek, near Denver, the scene of much of Colorado's gold mining activity since 1858.

A Link-Belt K-38 shovel excavates to bed rock, and two Link-Belt draglines (a K-38 and K-48) deliver to the portable Link-Belt gravel screening stacker mounted on crawler treads. Note the large rocks in the foreground, which have been handled through the system.

This work is part of the 241-mile Metropolitan Water District aqueduct for bringing water from the intake on the Colorado River to Los Angeles and 12 other California cities. The accuracy of control, and unusual stability of the Link-Belt K-55 used on this job, made it possible to handle and lay these 40-ton pipe sections with ease and dispatch, even on the steep slopes.

Laying 40-Ton Sections of Concrete Pipe

Mouth of tunnel and Link-Belt K-55 on upper level, particularly showing how the 40-ton pipe sections were hauled up and lowered into place on slope.



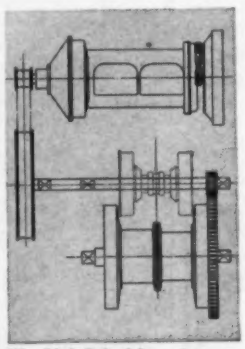
Navigation Dams for Inland Waterways

The extensive program of the War Dept. under the supervision of the U. S. Engineer Corps, for the development of navigation on inland waterways, is progressing rapidly. At present the center of activity is on the upper Mississippi River between St. Paul and St. Louis, where the construction of 27 movable dams is to be completed in two years.

Each of the first three dams completed in this program is of the roller-gate type, with a service bridge structure extending its entire length, on which a full-revolving, electric, self-propelled, wide-gauge Link-Belt locomotive crane is operated for general service, handling the poiree dam units, and for the removal of floating debris and sunken and water-logged drift accumulating in front of the roller-gates on the up-stream side.

Power is the Source of Speed

Power is essential to speed in shovel-crane-dragline work. Without ample power it is not possible to have generous speeds, unless the ability to do anything but the very lightest kind of work is sacrificed. It is not possible to get more out of a piece of equipment than the energy or power put into it.



The Link-Belt drive—from engine to drum shaft. Silent chain pinion on engine (or motor) shaft, and diameter of drum shells, readily changed to suit working conditions.

All Link-Belt heavy-duty Shovels-Cranes-Draglines will stand the slower speeds and maximum effort required for heavy-duty service, or the high speeds which are needed to produce maximum output in light service, or anything between these requirements. They are not confined to use in any particular class or classes of work, like a light or medium duty machine.

In the Link-Belt design, the speeds are easily changed to suit the work, by simply substituting the proper size of engine pinion and drum shells. These changes can be made quickly and inexpensively.

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Contractors and Engineers Monthly

Pumping Equipment at Bonneville

(Continued from page 9)

Installation of Equipment

Whether to attempt the unwatering from barges or from a stationary installation offered some question for consideration, but preliminary estimates indicated that, because much of the pumping had to be done during a relatively high river stage, an installation of vertical pumps suspended from the deck of a pile structure located in the deep hole would be cheaper, as the sides of the hole was overlaid with sand and gravel above the bed rock, making the driving of piles possible.

The bed of the river at this point is approximately at Elev. —55, but to place the pumps and motors above probable high water the deck was put at Elev. +40, or 95 feet above the bed of the river. This is about the height of an ordinary 8-story building. Piles, 110 feet long, were driven with a penetration of about 15 feet but due to the high water in the river, it was possible to place only one set of cross bracing, so that the tower stood in the river with a heavy loading at the top and relatively little rigidity. Cable ties were used to prevent tipping, and as the sump was lowered additional cross bracing was installed. Another point of particular interest was the double deck flume. At the time of starting unwatering operations, the river was at Elev. +31, whereas during most of the pumping time it was about 10 feet lower. A double deck flume was therefore made, the upper one for use during high water and the lower one during low water, thus saving pumping head.

Determining Pumping Requirements

Another interesting problem was the determination of the ultimate pump capacity which would be required when the water in the sump was lowered to its minimum depth. In this case, although the area of the enclosed lake at the time unwatering was started was about 25 acres, the actual volume of the impounded water being 700 acre-feet, the storage of the ground water which would flow in at a high rate as the pool level was lowered could only be estimated. Not wishing to install more pump capacity than necessary, it was decided on a total initial capacity of from 30,000 to 50,000 gpm, at a head varying from 85 to 0 feet. At the start, the inflow would of course be zero but as the difference in water levels increases the inflow increases, and the pump capacities decrease. There might be, therefore, a point where the inflow would equal the pump capacity, and without additional equipment the pool could not be lowered beyond this point. However, it was known that by lowering the water about 20 feet, a considerable excavation yardage would be exposed, allowing work to progress and at the same time additional pumping equipment could be installed, if found necessary.

Measuring the Leakage

It was to be anticipated that as the difference in water levels increased, the inflow would increase as some power of the head, and so careful observations were made to measure the inflow at different heads. Two methods were used.

Occasionally the rate at which the sump was being lowered would be carefully noted for two or three hours, a figure usually about 0.1 to 0.2-foot per hour. All pumps would then be stopped, and the regain measured for a given period. The pumping rate being known for a given head, it was only a matter of setting up a proportion to ascertain the inflow within reasonable limits of accuracy. Then later, when the water had been lowered to a point

(Continued on page 27)

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HOT OR COLD MIX
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Are You Losing Profits Through Lost Time?

Part V

IN this series of articles on the factors resulting in time losses in the construction of mixed bituminous pavements, suggestions have been made for the elimination of such losses through better plant management, the careful selection of equipment, and adequate hauling facilities. This installment of the study of this subject, made by the Division of Management, U. S. Bureau of Public Roads, and reported by C. F. Rogers, Assistant Highway Engineer, points out the necessity of constant attention to the details which may involve time losses, particularly in the finishing operations.

Studies of Time Losses in the Construction of Mixed Bituminous Roads

Finishing Operations on Surface Course Often Lag Behind Plant

When mixed material is delivered on the road or street it may be handled by one of several methods. The spreading may be entirely by hand or almost entirely by machine methods. Spreader boxes for attachment to trucks have been devised which are very satisfactory in spreading full-width base and surface course and also the narrow strips on widened sections.

For upper courses the use of half-width spreader boxes of either the sled or roller type followed by a full-width mechanical spreader is particularly recommended.

Mechanical finishers have been used with results that are very satisfactory both in quantity of paving laid and in smoothness of the surface. Such machines have enabled the handling of a larger plant production than could well be handled by hand methods. Finishing machines have been used on standard widths up to 30 feet and have been adapted to narrow strips 9 and 10 feet wide.

It occasionally happens that production is limited by finishing operations rather than plant mixing, and in such cases the finisher is the key unit. For example, on three projects with large capacity plants, a thin surface course required only 1,399 tons per mile or 0.265 ton per linear foot of road. The plant could supply material for surface course at a rate requiring a finishing speed of 9.46 feet per minute. This speed of finishing could not be consistently maintained and few machines have been observed capable of such a rate. In laying the thicker base course requiring 1,809 tons per mile a speed of 7.32 feet per minute was required. The machines on this job and most of those timed on other jobs were capable of this speed. It would have been possible to adjust the quantities of material for the two courses so as to maintain full plant production with a consistent gross speed of finishing of 8.25 feet per minute. In determining the relative thickness of courses the relation between probable plant production and finishing speed should be considered as a factor affecting cost.

Maintaining Finishing Speed

Finishing speeds as high as 12.9 feet per minute during periods of efficient operation were observed, but in only one instance was the finisher capable of maintaining an average speed which matched the maximum production of a large-capacity plant while laying thin surfaces. Reductions in average speed result from insufficient traction and time losses. Tractive losses vary with the number of drive wheels, type and condition of forms or form rails and height of material for some distance ahead of the screed. Time losses result from derailments caused by spreading forms and narrow wheel flanges; faulty spreading of material ahead of the screed requiring backing to fill holes; and delays in initial spreading.

Tractive losses normally reduce the speed by 8 or 9 per cent, but losses of 30 per cent have been observed under extreme conditions. Very satisfactory finishing machines have been built using a special power unit, special gears, and with four-wheel drive. Such machines have kept pace with a plant production of 187 tons per hour where there was a favorable relation between thickness of base and top course. No great difficulty should be encountered in spreading and finishing operations with a properly designed cross section and mix, and properly mixed batches.

(To be continued in April)

"It is the duty of every man to protect himself and those associated with him from accidents which may result in injury or death." —*Abraham Lincoln*

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Too many break-downs, delays and short profits? If your present equipment has been "stretched" over too many jobs and is fast becoming worn and obsolete—it's time to replace. A slip here, another there and YOU pay dearly! For contracts and schedules *are money.*

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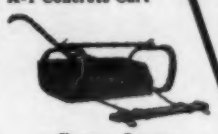
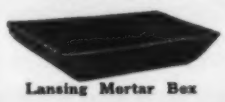
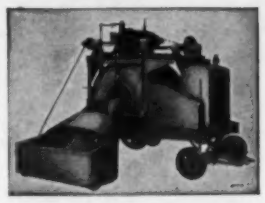
K-1 Concrete Cart


Fresno Scraper


Lansing Mortar Box


Lansing 10-S Concrete Mixer

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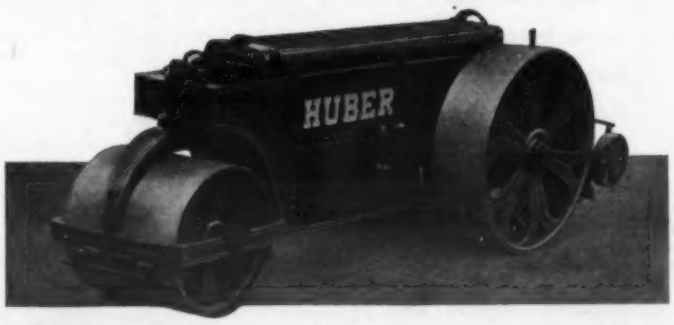

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COST LESS FOR EVERY GALLON PUMPED

1,218-Foot Bridge Erected by Georgia

(Continued from page 13)

crete in buggies, three men puddling, three finishing and using a 24-foot bull-float or screed which screeded one-half of the span at a time, thus insuring a reasonably smooth bridge floor.

Central Mixing Plant

The central mixing plant was used for furnishing concrete for the pre-cast balusters and for the concrete deck. A Jaeger 2-bag mixer was mounted on a platform at a height sufficient for the 1½-ton trucks to drive beneath, carrying 1-yard Blaw-Knox roller-gate buckets which were loaded direct from the mixer. The mixer skip ran on rails and dropped to the ground for loading. Two bins with wooden floors were set up along a railroad siding about 25 feet from the mixer, one for crushed granite and the other for sand. These aggregates were unloaded direct from the cars to the bins by hand. A Fairbanks platform scales for weighing the metal-body wheelbarrows was set in the runway from the bins to the mixer skip. Two men shoveled and wheeled sand and four men handled the stone.

The cement house was 100 feet away from the plant and connected to it with a sloping ramp down which the cement was wheeled after weighing. Sack cement was used but the batch was 1¾ bags so the split bag had to be weighed out. One man weighed and loaded while another rolled his wheelbarrow load down the ramp.

Casting the Balusters

There were 2,300 concrete balusters required for the job and these were all pre-cast at the central mixing plant and taken to the deck of the bridge for curing under sawdust which was used also for curing the entire deck. It has been noted before in these pages that sawdust is excellent for this purpose where it is available at little expense. A large pile of sawdust was noted burning in a sawmill yard not more than 300 yards from the Milledgeville end of the bridge and this mill was the source of the sawdust used for curing.

The balusters measured 2 feet 1 inch long and 3 x 5 inches in end section with a ½-inch chamfer 1 foot 7 inches long on all four corners. A reinforcing bar, ⅜-inch round, and 2 feet 8 inches long was cast in the center of each baluster. When setting the balusters in the hand-rail forms these ends of reinforcing were cut to bring the baluster to the proper elevation for the form.

Gang molds of wood were used to cast the balusters 95 at a time. They were cast with the thinner section vertical. The reinforcing rods were placed in the molds through holes bored at the proper intervals in the 2 x 6's that made up the ends of the molds. The concrete was handled by two men wheeling from the mixer, two men puddling and finishing. The balusters were all hand-rubbed on the bridge deck after the period of curing was ended and just before they were to be set in the hand-rail for casting to form the complete unit. When the hand-rails were poured there were two men working on the forms and two men finishing, these being men who had worked on the earlier casting of the balusters and not a new crew.

Personnel

On this contract F. B. Carson was Superintendent for Cornell-Young Co., of Macon, Ga., and E. W. Ellis was Resident Engineer for the State Highway Department, succeeding H. M. Sweat, former Resident Engineer, who was accidentally killed while performing his duties on this project.

Oil Bath Type

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Look Inside

the air cleaners you are now using on trucks, air compressors and power driven road machinery. For once you see the inside of your present filters, you will know why we say look inside of a filter. Air-Maze is different from other filters in that it has an exact, uniform, density and does not clog up or cause any retarding restrictions. • A clogged air filter is a costly thing—it cuts down gasoline mileage as much as 20%. But Air-Maze doesn't work that way, and you can have an Air-Maze by simply specifying it whenever you order air compressors or engine powered equipment. Let us tell how Air-Maze will re-value your Air Filter experience.

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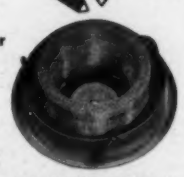

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Williams buckets are digging demons—loaders from every angle! Hook them to your cranes for bigger yardage—more profit per job. *Write for bulletins.*

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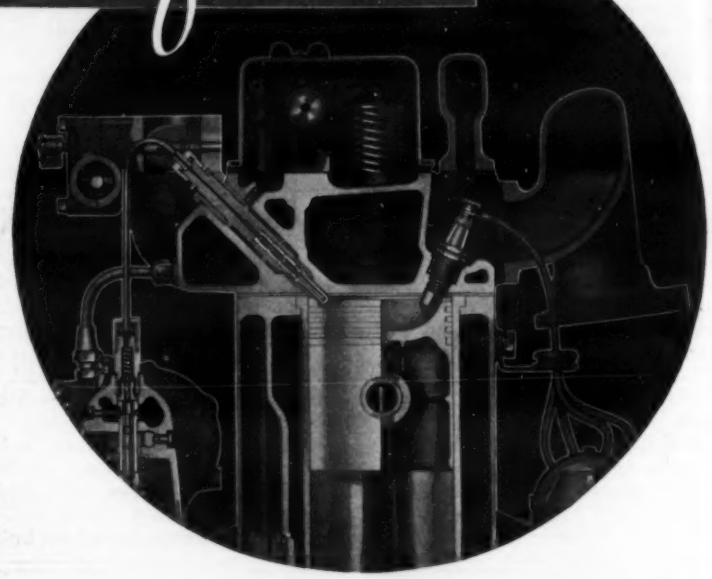


The Waukesha-Hesselman Oil Engine is in no sense a semi-Diesel. No preliminary warming up of hot bulbs or hot spots. It starts as easily, burns its fuel as cleanly, runs as smoothly as a gasoline engine . . . and develops equal or greater power.

The Hesselman cycle is as easily understood as the gasoline engine four-cycle. On the intake stroke, air alone is admitted to the cylinder . . . no fuel until compression is nearly completed. The charge of air is compressed to about 150 pounds, and just before the end of the compression stroke, the fuel is injected by a conventional Diesel injection pump. Owing to the form of the combustion chamber, the air is compressed in a definite turbulence pattern which picks up the finely atomized fuel from the injector, thoroughly mixes with it, and sweeps it as a highly combustible mixture, past the spark plug which ignites the charge. This starts the power stroke.

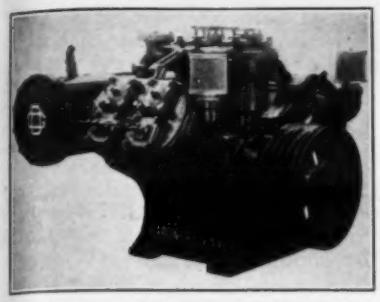
After the power stroke, the exhaust valve opens, the piston returns, the cylinder is scavenged, and thus prepared for a repetition of the cycle. Neither air nor fuel is preheated so that delivered power and volumetric efficiency are correspondingly high.

The Hesselman employs a simple, open type injector nozzle with two spray holes—one spray directed against the air swirl, the other with it. The fuel is thus atomized and thoroughly mixed by the turbulence. This air turbulence method of mixing the fuel charge permits the use of large holes which do not become clogged with particles of foreign matter that may be present in the fuel, nor does carbon lodge in them.

Write for Bulletin 1000. *Waukesha Motor Company, Waukesha, Wisconsin.*

THIS IS No. 2 OF A SERIES on the Hesselman Oil Engine. No. 3 will appear next month. A reprint of the complete series will be mailed on request.

WAUKESHA ENGINES



The New 6-Cylinder Two-Stage Air Compressor

Improved Cylinder Design Feature of New Compressor

Carrying on the modern trend towards more delivered air, lower power consumption and longer compressor life, Gardner-Denver Co., Quincy, Ill., has recently announced a new Class WB 6-cylinder two-stage water-cooled compressor with several distinctive features. According to the manufacturer, these features provide more delivered air, with a resultant saving in power cost.

A departure from the conventional compressor design is the use of four small-diameter low-pressure cylinders, instead of two large ones, permitting the use of small light-weight pistons and reducing the inertia loads. The use of two pairs of low-pressure water-cooled cylinders provides lower air temperatures. By water cooling the cylinder walls, lower wall temperatures are secured, with better lubrication and longer life.

Mountings for this new compressor include the motor mounted on the shaft; V-belt to electric motor, diesel or gasoline engines; or direct-connected through flexible flywheel coupling to motor and engines.

Rome Graders Taken Over by New Corporation

The Rome road grader business formerly owned by the Rome Manufacturing Co., Division of Revere Copper and Brass, Inc., Rome, N.Y., has been purchased by a group headed by J. M. Patterson, who previously managed this department for Revere. A new company has been formed under the name Rome Grader & Machinery Corp., Rome, N.Y., to take over this business.

The new organization plans to be in production about the middle of March with a full line of Rome high-lift drawn graders, Rome motor graders, and Rome auto mowers and will later add more items of road building equipment.

Engineering Products Co. New Cummins Dealer

The Cummins Engine Co., Columbus, Ind., manufacturer of industrial diesel engines for a wide variety of services, has appointed the Engineering Products Co., 122 So. Michigan Ave., Chicago, Ill., as exclusive dealer in Cummins engines for the Chicago territory.

Universal Atlas Cement Co. Appoints New Sales Manager

The appointment of A. O. Stark as Sales Manager, New York, has been announced by Universal Atlas Cement Co., a subsidiary of United States Steel Corp. Mr. Stark, who succeeds N. A. Kelly, deceased, has been with the Universal Atlas company since 1908, and has served in various capacities, including Export Manager and Assistant Sales Manager from 1913 to the present time.

W. R. Heckendorn, former district sales manager in Boston, has been appointed Assistant Sales Manager in New York and H. F. Van Wagner, district sales manager in Newark, has been transferred to Boston, to succeed Heckendorn.

2
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10

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pneumatic rear tires on 4 rocking axles
make this ROGERS TRAILER the king of them all!

Carrying capacity—10-40 tons. Load equally distributed on the 8 rear tires. The same low-hung body—for easy loading. The same low upkeep costs for which ROGERS TRAILERS ARE FAMOUS!

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WHETHER weather or no, Bucyrus-Monighan walking draglines keep right on delivering big output at low cost. They don't mire down because, when digging, their ground-bearing pressure is distributed over the whole area of the base. The walking shoes are raised high off the ground, come down on fresh, unchurned sections when it's time to "walk" again. If an unusually deep muck hole is encountered, the shoes can be raised and turned to a new location, or supporting material placed under them. If you "weatherproof" your jobs with Bucyrus-Monighans, you will be "Singing in the Rain" with profitable, all-weather output.

weather

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EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

SAUERMAN
LONG RANGE MACHINES

for Digging in the Dry or Under Water

Reach as far as 1500 ft.

Dig Deep; Dump High.

Capacities from 100 to 5,000 cu. yd. a day.

Low in Cost

Write for Catalog.

SAUERMAN BROS., Inc.
464 S. Clinton St.
CHICAGO . . . .

Paving Problems on Florida NRM Job

(Continued from page 2)

pounds of sand for the 5-bag mix. There were two men in the cars cleaning up and spotting the bucket, the crane operator, one man on top of the bins pulling out rags and roots, the batch man and the tractor operator to move the cars.

Placing the Concrete

There were two men on the grade emptying the bags of cement onto the batches in the trucks about 200 feet from the 27E Leach paver. One man spotted and dumped the batches and cleaned out the trucks. There were an operator and a helper on the paver, the latter operating the skip. A Lakewood tail-grader was pulled by the paver, cutting the final grade to true cross section, with two men shoveling the excess sand out from in front of the grader. Immediately behind the tail-grader two men pushed a scratch board for a final check before any steel was placed.

Two men set the Truscon center steel and the expansion joints which were inserted in the slab every 100 feet. Four men handled the placing of the reinforcing mats as soon as the center steel had been placed. The bars in the mats were all ⅜-inch and the transverse bars were placed every 3 feet 1 inch, doubling up at the expansion joints and with diagonal bars at the corners at all expansion joints. There were 22 bars running longitudinally and spaced 2 inches from the top and the same spacing from the base of the slab. All the reinforcing mats were made at the contractor's batching plant on specially prepared templates and jigs.

Finishing and Curing

As soon as a batch was spread by the paver bucket it was puddled by four men. Then the Ord finisher, widened from the standard 20-foot width to 27 feet for this contract, and operated by a LeRoi engine, followed. There were five hand finishers who worked on the following operations in this sequence: used the 14-foot bull-float from a double rolling bridge pushed ahead by the finishers, used a 10-foot drag straight-edge to pull off any excess water brought to the surface by the heat, then used a 10-foot long-handled float for taking out high spots or working up low spots, used an 8-inch belt and then edged the slab. A special bridge 18 inches wide was set for the finishers at each expansion joint to permit a little more comfort on this important task. A 1-inch board was set for each expansion joint and then pulled as the slab was finished and edged about it. The expansion joints were all poured. The board had a thin strip of black sheet iron on each side to make the pulling easier.

Two men with a wide bridge holding the burlap spread the 30-foot strips 3-feet wide over the slab, leaving it on until the next morning but keeping it wet for the entire period. The first thing in the morning the finishers went back, removed the burlap and check straight-edged the slab, under the inspection of the Resident Engineer, to see whether the specified ⅛-inch variation from a true plane in 10 feet had been exceeded.

Immediately following the acceptance of the pavement by the inspector a crew of six men, three on a side, and usually from the fine grade crew, hand-cast sand over the entire surface of the pavement to a depth of 2 inches. This covering was sprinkled for a period of ten days and then removed by hand.

The water supply for the contract was taken from the city mains through a metered connection to a city hydrant and carried along the curb through a 2-inch pipe, with taps for the paver hose every 300 feet. The paver carried 500 feet of 2-inch hose.

Labor Organization

This contract ran 60 hours a week with 11 hours of operation each day that the weather permitted. The morning shift was six hours and the afternoon shift five hours. Saturday morning the afternoon shift worked to make up their thirty hours for the week and there was still the time after noon which could be used to make up any lost time.

Personnel

The contract for this NRM Project 131 was awarded to T. B. Gillespie, Inc., of Palatka, Fla., for $95,645.14. C. E. Perritte was Superintendent for the contractor and W. I. Phelps was Project Engineer for the State Road Department of Florida.

THE Burch CHIP-IT-OVER is the machine you need for fast, accurate, low cost spreading of all materials from sand to 1 inch stone. Hooked to the rear of a truck in 30 seconds, it spreads material at any desired rate up to a yard a minute. Write for complete details.

THE BURCH CORP.,
Crestline, O.

ROAD AND SHOULDER MAINTAINERS CRACK FILLERS
SPREADERS FOR STONE, ASPHALT, AND CHIPS
CAR UNLOADERS CONVEYORS TRENCH FILLERS
ROAD AND STREET CASTINGS SECTIONAL CAST IRON PIPE
THE ROSS SNOW PLOW

for BETTER ROADS at LOWER COST

Mall

CONCRETE VIBRATORS

GASOLINE ENGINE OR ELECTRIC MOTOR UNITS

Sizes and Types for Large Mass and Small Wall Pourings

Mall 2 h.p., 3600 RPM Gasoline Engine Concrete Vibrating Machine with Automatic Clutch and 2⅜"x18" Vibrator. Can be furnished with 14 ft., 21 ft. or 28 ft. of Flexible Shafting. Attachments Available for Concrete Surfacing.

WRITE FOR CATALOG

MALL TOOL COMPANY

7743 South Chicago Ave., Chicago, Illinois.

KOEHRING

KOEHRING Heavy Duty Construction — Easy and positive steering in any direction, by lever control from the cab — self-equalizing double outside band friction clutches — low ground pressure — swiveling boom point fairlead for reducing cable wear—*all important features for dragline work* — available with a Koehring Dragline.

The Koehring boom point fairlead saves cable by eliminating cross pull and self-aligning cables regardless of bucket position.

KOEHRING COMPANY

Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks

3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

Pumping Equipment at Bonneville

(Continued from page 22)

where it could be held stationary for several hours, this was done by operating only enough pumps to equal the inflow, which automatically measured the leakage.

The Battery of Pumps

At the start of the work, three Byron Jackson 200-hp vertical dewatering pumps and two 50-hp pumps, made with columns 35 feet in length so that the water could be lowered 35 feet at a time, were suspended from the deck of the structure by cables, one end of which was made stationary at the top, and passed down to a sheave above the pump and back to the deck. The end of this cable was connected to a large eye bolt at the deck. This bolt had about 3 feet of thread so that minor adjustments of position could be made by screwing a nut on the eye bolt. The sheave was attached to a yoke which supported the pump.

After dewatering started, three more Byron Jackson 200-hp pumps were added, so that the total capacity of the units was from 55,000 gpm at maximum head to 90,000 gpm at zero head.

Personnel

The contract for the unwatering and excavation for the power house and locks at Bonneville was awarded February 6, 1934 to Guy F. Atkinson Co. of San Francisco, Calif. Work was started February 7 and completed October 2, 1934. The project is being carried on with PWA funds, with Col. T. M. Robins, Division Engineer, Major C. F. Williams, District Engineer, Major H. A. Skerry, Executive Officer, C. I. Grimm, Chief Civilian Engineer and Capt. F. J. Gorlinski, Resident Engineer.

During the work described above, George E. Goodwin was Resident Engineer, V. L. Glaze and T. F. Johnson were Job Engineers for the U. S. Engineer Corps. For the contractor, George H. Atkinson was General Manager, Ray Northcott, Assistant Manager, Jack Senfield, General Superintendent and D. E. Root, Engineer.

1934 Improved Mileage Is Colorado's Largest

Colorado, because of its scenery and climate, is famous as a resort for tourists, and as everyone knows, the revenue to any tourist-invaded state is a sizable one. Because of this, both the state and various county highway organizations are engaged in continual effort to increase the state's mileage of improved highways. This work went on apace in 1934 and resulted in a greater mileage of improvement than in any previous year.

Federal-Aid projects, constructed in 1934, by the State Highway Department in cooperation with the U. S. Bureau of Public Roads, are as follows:

Projects	*Miles*
Graded projects	18
Gravel or crushed rock surfacing	321
Oil-processed surfacing	2
Bituminous pavement	15
Concrete pavement	20
Total	376

The State Highway Department also constructed 505 miles of oil-processed roads and 10 miles of grading and surfacing, bringing the total construction for the year to 891 miles.

The status of improvement on Colorado's Federal-Aid system is as follows:

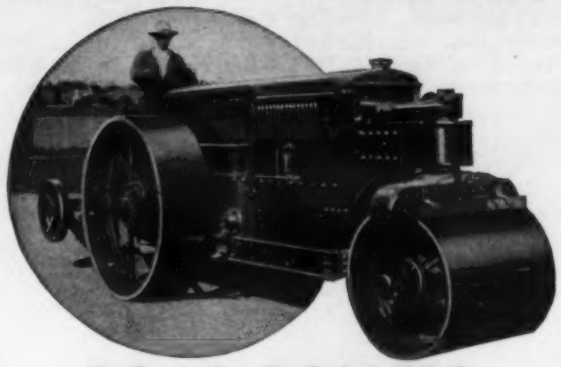
Mileage to Federal Standards	
Rock asphalt pavement	6
Graded	36
Surfaced	676
Oil-processed surface	976
Cement concrete pavement	532
Bituminous macadam	4
Bituminous concrete pavement	62
Brick pavement	1
Total	2,293
Mileage Not to Federal Standards	
Graded	636
Surfaced	583
Oil-processed surface	26
Total	1,245
Grand Total	3,538

This mileage is approximately one-third of the total mileage of state highways in Colorado, and includes the most heavily traveled roads in the state.

In accordance with Federal legislation, a portion of Federal funds is being used for roadside beautification.

Equally important along with the initial cost of a roller are the cost of operation and the outlay for maintenance. Do not lose sight of these factors when making a selection.

BUFFALO - SPRINGFIELD

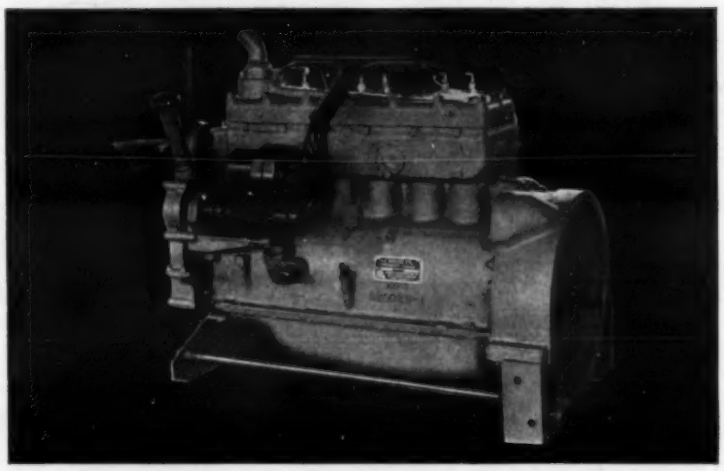


ROAD ROLLERS

Sizes 2½ to 17 tons. 3-wheel and tandem. Attachments including scarifier, optional

THE BUFFALO-SPRINGFIELD ROLLER CO.
Springfield, Ohio

WHY
CHRYSLER
can give you so much engine at so little cost . . .



"CHRYSLER builds a great engine" . . . that's a statement you'll hear everywhere.

Not everybody realizes, however, how we can produce so much engine for so little money.

40,000,000 Horsepower in a single year

In 1934, Chrysler built engines totalling 40,000,000 horsepower. Think what that means in being able to command engineering talent and research facilities. Chrysler's engineering laboratory alone represents a bigger investment than many engine manufacturers' entire plants.

Why you get the good things first

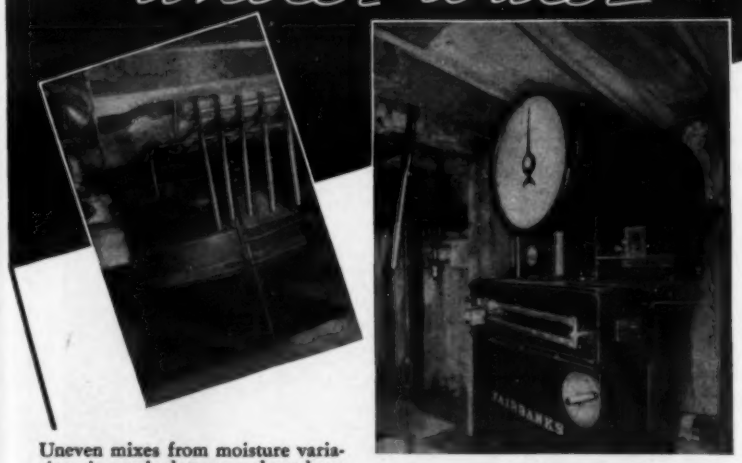
You get the good new things first in Chrysler engines because Chrysler can spread charges over big production. Chrysler never offers you an out-dated engine. And Chrysler engines stand up because Chrysler designs and builds practically every part . . . and because there isn't a single advancement in precision manufacture that Chrysler doesn't use.

Every year sees Chrysler engines going into an increasing variety of industrial installations. And no wonder! For these engines not only deliver a finer kind of satisfaction . . . they deliver it at a decidedly lower cost.

1 Leading engineers
2 Great research laboratories
3 Vast facilities for volume production and precision manufacture

AMPLEX DIVISION
CHRYSLER MOTORS
DETROIT, MICHIGAN

WEIGHING CONCRETE AGGREGATES *under water*



Uneven mixes from moisture variations in crushed stone and sand are a thing of the past with the new Fairbanks underwater weighing method.

In building a long sea wall in Santa Monica harbor, Graham Brothers of Los Angeles determined the proportion of the mix using thoroughly wet sand and gravel. With the scale hopper set into a conical water tank and completely submerged, sand and rock are each dropped in and weighed under water. The surplus moisture is quickly drained away from the pre-set desired level, and an aggregate of perfectly proportioned sand, stone and water, is ready to be dropped in the transit mixer.

No chance for guesswork with moisture predetermined and a Fairbanks scale there to insure correct weight and proportions.

For complete information on this and many other Fairbanks scales for the construction industry, write Fairbanks, Morse & Co., 900 South Wabash Avenue, Chicago, Illinois. Branches in principal cities, a service station at each branch.

Fairbanks Scales

6279-8A31.16

Maintaining Oil Roads With Power Auto Patrols

The Kettleman North Dome Association and the Standard Oil Co. are each maintaining over 60 miles of oiled road in excellent condition in the hilly oil field area of Kettleman Hills, Kings County, Calif., with Caterpillar No. 11 Auto Patrols purchased from the Cousins Tractor Co., Inc., Hanford, Calif., on March 2 and April 14, 1934, respectively.

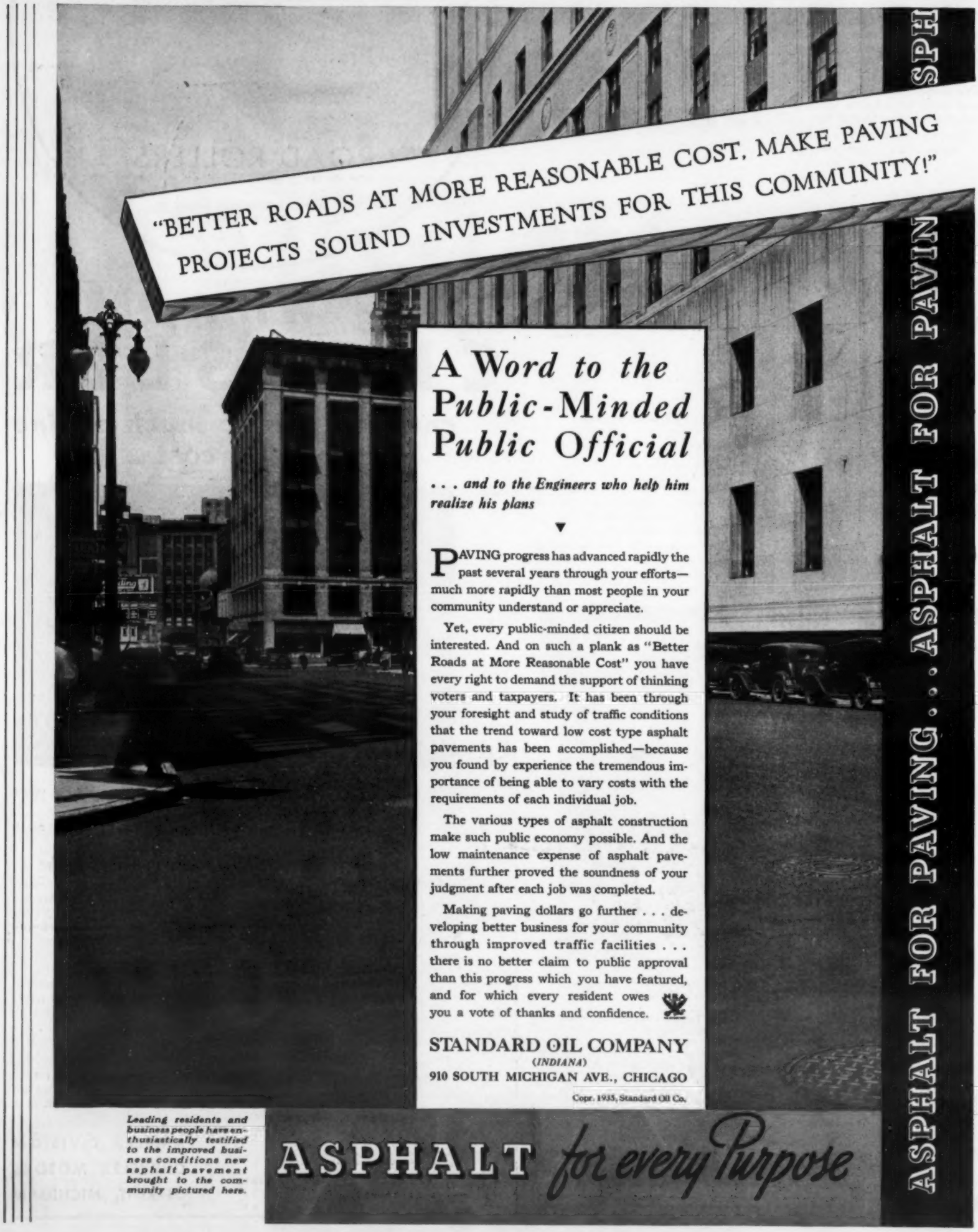
Harron-Rickard & McCone Hercules Roller Dealer

The Hercules Co., Marion, Ohio, has announced the appointment of Harron-Rickard & McCone Co., 2205 Santa Fe Ave., Los Angeles, Calif., as distributor in southern California for the complete line of Hercules road rollers and Hercules Ironer rolls.

W. T. Harron, President, and Frank E. Edmonds, Sales Manager, of this well-known distributing organization were recent visitors to the Hercules Co. factory.

Gas Welding Practice

Advances in the use of the oxy-acetylene process of cutting and welding have widened its use during recent years so that in spite of the fact that safety measures for its use are well standardized, additional emphasis in safety precautions is needed. These have been incorporated in a booklet, "Precautions and Safe Practices," a revised edition of the original publication issued by the Linde Air Products Co., 30 E. 42nd St., New York City, several years ago. The earlier booklet was generally accepted as the standard reference book on this important phase of safety in the welding industry. It covers all of the details in the storage, care and handling of oxy-acetylene welding and cutting equipment and should be in the hands of every shop, contractor or department where this type of work is performed.


"BETTER ROADS AT MORE REASONABLE COST, MAKE PAVING PROJECTS SOUND INVESTMENTS FOR THIS COMMUNITY!"
ASPHALT FOR PAVING . . . ASPHALT FOR PAVING . . . ASPHALT

A Word to the Public-Minded Public Official

. . . and to the Engineers who help him realize his plans

▼

PAVING progress has advanced rapidly the past several years through your efforts—much more rapidly than most people in your community understand or appreciate.

Yet, every public-minded citizen should be interested. And on such a plank as "Better Roads at More Reasonable Cost" you have every right to demand the support of thinking voters and taxpayers. It has been through your foresight and study of traffic conditions that the trend toward low cost type asphalt pavements has been accomplished—because you found by experience the tremendous importance of being able to vary costs with the requirements of each individual job.

The various types of asphalt construction make such public economy possible. And the low maintenance expense of asphalt pavements further proved the soundness of your judgment after each job was completed.

Making paving dollars go further . . . developing better business for your community through improved traffic facilities . . . there is no better claim to public approval than this progress which you have featured, and for which every resident owes you a vote of thanks and confidence.

STANDARD OIL COMPANY
(INDIANA)
910 SOUTH MICHIGAN AVE., CHICAGO

Copr. 1935, Standard Oil Co.

Leading residents and business people have enthusiastically testified to the improved business conditions new asphalt pavement brought to the community pictured here.

ASPHALT *for every Purpose*

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Contractor Sues for Damages Instead of Price

The contractor who has failed to complete performance of his contract—although without his fault—is not entitled to recover the full contract price. He must content himself with a claim for damages.

So, in the recent case of Haskell v. Stryker, 11 Pac. 2d, 700, the Kansas Supreme Court ruled that where the owner prevented a building contractor from finishing the job after it had been partly done, the contractor could not recover the lump sum price agreed upon. And because he did not prove the amount of his damage, resulting from the owner's breach, the contractor was denied recovery.

When Guaranty of Payment Must Be in Writing

A "gentleman's agreement" and a legal contract may be two widely different things when it comes to enforcing them in the courts. An example exists where a contractor agreed to pay a past-due account owed by a subcontractor to a materialman. The agreement is covered by a statute in force in nearly all, if not all of the states. The statute says that one shall not be held liable on a promise to pay the debt of another unless the promise is in writing and signed by him.

This rule of law was lately enforced by the Louisiana Court of Appeals in the case of Williams & Gray v. Stewart, 147 So. 103.

But the rule is not to be confused with that applying to cases where a debt for labor or materials was originally incurred on the faith of a third party's promise to pay. To illustrate, if a materialman sells and delivers materials to a subcontractor on a promise of the general contractor to see that the bill is paid, the promise need not be in writing in order to bind the contractor. He makes the debt his own, although he may expect reimbursement from the subcontractor, and therefore the promise does not come within the statutes governing agreements to pay third persons' debts.

Contractor Responsible For Failure

"I followed your plans, and am therefore not responsible because the foundation I built for you settled on account of soil conditions," said a Brooklyn contractor when an owner sought to hold him responsible for the cost of repairing defects due to insufficiency of soil strata to carry footings constructed by the contractor.

Upholding the owner's claim, the New York City Court in Brooklyn said, in part (Rubin v. Coles, 253 N. Y. Supp. 808):

"While it is true that here the plans provided footings, depths, and dimensions, they are entirely silent as to that most important factor, the character of the soil or fill upon which the foundations therein described were to rest. This element was therefore left entirely to the skill and competency of the general contractor. . . . It has been repeatedly held that even though he be bound to follow fixed plans and specifications, the contractor owes the duty of examining such plans and judging of their sufficiency; that he is bound to discover defects which are reasonably discoverable or patent; and, where he knows or had reason to believe that the plans are defective and follows them without pointing out such defects to the owner or architect, he is responsible if the building proves insufficient because of such defects."

Employee's Rights Under Profit-Sharing Contract

It does not seem to be uncommon for those engaged in construction work on an extensive scale to employ assistants or superintendents on a profit-sharing basis. Engineers and contractors who are about to enter into such contracts may profit by the experience of the parties to such a contract, by making it clear whether or not losses or deficiencies under a guaranteed minimum for one year are to be taken into account in more prosperous years.

McFarland entered Contractor Gillioz' employment as supervising assistant on general construction jobs, under a contract running for three years. He was to receive one-fourth of the profits of the business, with a minimum guarantee of $500 monthly.

The first year there was a net loss in operations. The second year there was a net profit of nearly $20,000, not enough to entitle McFarland to anything above his $6,000 under the minimum guaranty. The third year, there was a net profit of $90,000 plus—more than $16,000 above the $6,000 guaranty.

Gillioz insisted that, in determining the amount due McFarland, the net loss for the first year should be deducted from the net profits for the second and third years. The result should be divided by four and from that result should be deducted the $18,000 paid under the minimum guaranty. On the other hand, McFarland insisted, and the court held with him (37 S.W. 2d, 911) that each year stood on its own, as the contract was worded. When the first year ended with a loss, he was entitled to his $6,000 guaranty and no more. His compensation was the same the second year, when there was a net profit but not more than four times $6,000. And when the parties started on the third year, the employee's fortunes depended wholly upon the business of that year, and his share of the profits for that year were not cut down by the failure of the net profits in the two preceding years to come up to the minimum guaranty. The difference in the methods of computation entailed a difference of about $10,000.

It follows that if, under such a contract, the employer expects that where the earnings of one year do not yield enough to pay the guaranteed amount, on the share basis agreed upon, the deficit may be credited against surplus earnings in another year, he should see to it that the contract is so worded in unmistakable terms.

Risky to Disregard Provisions of Contract

All losses sustained by contractors do not result from the Depression and the Stock Market. In fact, one of the chief causes of loss is *failure to observe the requirements of contracts into which they have entered.*

Witness the experience of a Pennsylvania sewer contractor, who was denied the right to recover for extra work, because he failed to secure a written order for the work from the supervising engineer, as required by the contract. The Pennsylvania Supreme Court said (Morgan v. City of Johnstown, 160 Atl. 696):

"Whatever the rule may be as to the waiver of such a requirement in contracts with individuals, as to municipal contracts we have held in a long line of cases . . . that the provisions of such contracts must be strictly pursued."

The court recognized that by formal action the city might have waived the contractor's failure to present the engineer's certificate, but said:

"That individual councilmen or other city authorities knew of the altered method of doing the work and approved it cannot be set up by the contractor to warrant his claim for extra work, where the written contract provides upon what his claim must be based. The agreement cannot be waived or altered in any such loose way. If it is to be changed, it must be by the same formal municipal action that created it."

Littleford Model "M" Pressure Distributor applying surface coat on an Oklahoma highway. This low-cost Distributor is made in sizes from 300 to 1000 gallons.

What You Need, We've Got!

Whether you have large or small surfacing jobs, long hauls or short hauls, heavy penetration type asphalt or light road oil—we have an outfit particularly suitable for your work.

Take the machine shown above—our Model "M" Distributor. It is a low-cost machine that handles road oils, emulsions and cut-back in fine style.

Then there is Model "C" Distributor—our pride and joy. It handles any kind of bituminous material, will load or empty itself at the rate of 250 G.P.M., thaw out working parts in five minutes and be ready to apply material in half an hour. That is absolute fact!

If you have skin or penetration patch work to do, there is no quicker way than to put a Littleford Tar & Asphalt Kettle on the job. Equip it with a Littleford Hand or Motor Spray Attachment and you have a complete maintenance unit.

Write for full information covering our entire line of Road Equipment. We'll gladly send it without obligating you.

LITTLEFORD

Road Maintenance Equipment

SINCE 1900

THE SIGN OF A GOOD HEATER LB LITTLEFORD BROS. CINCINNATI

LITTLEFORD BROS. 485 E. PEARL ST. CINCINNATI, O.

A HANDY TRAILER MIXER

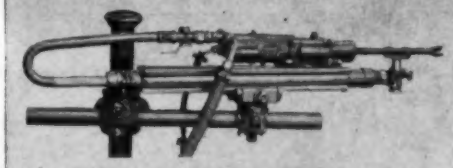
This 3½-cubic-foot Trailer Mixer may be loaded or discharged from either side, as it is fitted with an interchangeable lock. Ball bearing head with few wearing parts. It is easily and quickly moved from one job to the next because of its strong rubber-tired steel wheels (with 6-inch hubs). Power is furnished by a reliable 1¾-hp. engine.

Write for complete specifications

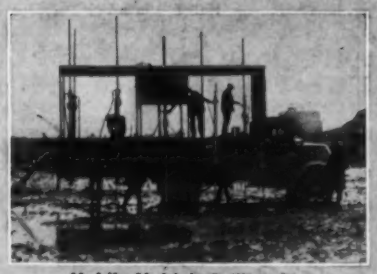
The J. B. Foote Foundry Co.
Fredericktown, O.

In Rock Drilling Equipment . . .

WORTHINGTON HAS PIONEERED *The Pneumatic Self-feed Drifter • The Hole Spotter • The Multiple Drilling Rig • The Tilting Tower on Wagon Drills • The Rock Master*

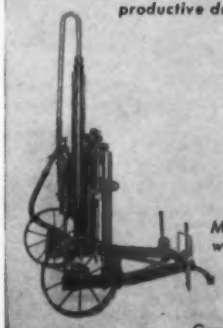


Pneumatic Self-feed Drifter
Automatic feed increases productive drilling time



Mobile Multiple Drilling Rig
Speeds up operations by having a battery of Rock Drills mounted on truck

Hole Spotter
Collars the hole quickly, without danger of injuring the operator



The Rock Master
Meets the demand for a light weight, mobile, all-purpose drill

Tilting Tower on Wagon Drills
Rapid adjustment to vertical position gets machine at work more quickly

WORTHINGTON PUMP AND MACHINERY CORPORATION
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WORTHINGTON

Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

Low-Cost Handling of Materials

314 The Howell Industrial Truck Co., 6545 Carnegie Ave., Cleveland, Ohio will be glad to send to those interested complete information on the Howell Type 27 Lift-Dump truck, the body of which is designed to suit conditions of hand, chute or power loading and is equipped with hydraulic lift and dump.

New Catalog on Asphalt Distributors

315 Bulletin A-1935, recently issued by Kinney Mfg. Co., 3531 Washington St., Boston, Mass., gives seven reasons why it is profitable for contractors and engineers to use Kinney asphalt and oil distributors for road construction and maintenance.

Make Bridges Fireproof and Safe

316 Complete information on Carnegie all-steel sections for bridge construction, including CBP sections, T-Tri-Lok and I-Beam-Lok flooring, the use of which assures long life and safety from fire, may be secured by contractors, highway and bridge engineers from the Carnegie Steel Co., Pittsburgh, Pa.

New Mortar and Concrete Wheelbarrow

317 The new and improved No. 64-C Bull Frog steel tray mortar and concrete wheelbarrow, features of which are its serviceability, the shaped handles, the high riser, the forward position of the seamless tray, the rounded nose for easy dumping, and the nose guard, is described in literature which the Toledo Wheelbarrow Co., Toledo, Ohio, will be glad to send on request.

New Crushing and Screening Plants

318 The Pioneer 15-35 Duplex crushing, screening and loading plant, which has a number of features of interest to contractors and highway departments for the economical production of sand and gravel, is described in literature which the Pioneer Gravel Equipment Mfg. Co., 1511 Central Ave., Minneapolis, Minn., will be glad to send on request.

Street Maintenance Equipment

319 South Bend bituminous pressure distributors, street flushers and sprinklers are described in literature which contractors, state and county highway engineers and officials may secure free upon request from the Municipal Supply Co., South Bend, Ind.

Disc Spreader for Sand or Gravel

320 Kob Mfg. Co., 329 E. Brown St., Milwaukee, Wis., will be glad to send to those interested complete information and prices on the Kob disc spreader, for sand, gravel, chips, shale, cinders or calcium chloride, which has a 20-foot back-up spread.

New Bridge Flooring

321 Literature describing the new Truscon heavy-duty bridge flooring, known as I-Grid which combines many of the features of the Teegrid flooring plus lighter weight and several other improvements may be secured by interested contractors and engineers from Truscon Steel Co., Youngstown, Ohio.

New Shovel Announced by Koehring

322 Information on a new 2-cubic yard shovel convertible to either crane or dragline and furnished with gasoline, diesel, oil or electric power may be secured from the Koehring Co., Milwaukee, Wis.

SEND THIS BACK—WE'LL DO THE REST

CONTRACTORS and ENGINEERS MONTHLY
470 FOURTH AVE., NEW YORK

Please send me the following literature, without cost or obligation

(Indicate by numbers)

Name_____

Firm_____

Street_____

City_____

*P.S. Also send me catalog and prices on*_____

Streamline Engine Oil

323 Complete information on its new light lubricating oil which flows freely during frigid temperatures and yet maintains its body at high temperatures may be secured by interested contractors and engineers from the Standard Oil Co. of Indiana, 910 So. Michigan Ave., Chicago, Ill.

Diesel Power for Construction Equipment

324 International Harvester Co. of America, Inc., 606 So. Michigan Ave., Chicago, Ill., will be glad to send interested contractors and engineers its 34-page booklet describing McCormick-Deering diesel power plants for construction equipment.

Recorder for Automatic Batching

325 A four-page bulletin issued by Streeter-Amet Co., 4101 Ravenswood Ave., Chicago, Ill., describes the new type L-8B recorder for automatic weighing and batching control.

An Economical Mowing Tool

326 The Detroit motor scythe, which is easily operated by one man and will cut all kinds of weeds and grass quickly and economically, is described in literature which the Detroit Harvester Co., 5450 W. Jefferson Ave., Detroit, Mich., will be glad to send on request to state and county highway engineers and officials.

Shovel News Free

327 Contractors and engineers interested in road building and general construction may secure the Link-Belt Shovel News regularly without obligation by sending name and address to the Link-Belt Co., 300 W. Pershing Road, Chicago, Ill., manufacturer of shovels, cranes and draglines, and mentioning this magazine.

An Electric-Motor Price Wheel

328 The Louis Allis Co., manufacturer of direct and alternating current motors in Milwaukee, Wis., has prepared an electric-motor price wheel consisting of two fibre discs about 8 inches in diameter which quickly and accurately tell the frame sizes and list prices of 448 popular sizes and types of electric motors. One of these price wheels will be sent to you with the company's compliments if requested upon your firm's letterhead.

Welders and Welding Accessories

329 Two new catalogs, one describing General Electric portable arc welders of the Type WD, in various suitable sizes and ratings, and the other describing the G-E line of welding electrodes and accessories, may be secured by interested contractors and engineers from the General Electric Co., Schenectady, N. Y.

Bulk Cement Handled By Air

330 The Robinson air-activated conveyor, a simple device using air alone to move bulk cement, is illustrated and described in a bulletin which may be secured from E. Gwynn Robinson, 10 E. 43rd St., New York City. With 45 pounds air pressure bulk cement is moved readily through a 5-inch flanged steel tubing distances up to 1,000 feet.

Mechanical Rubber Goods

331 This title covers scores of rubber products used for construction purposes, including conveyor and power transmission belting, hose for water, steam, dredging and pavers, with the necessary couplings, sheet and sectional packing and gaskets, and pump valves and diaphragms, all of which are described in Catalog No. 34 recently issued by New York Belting & Packing Co., 1 Market St., Passaic, N. J., from whom copies may be secured free on request.

WORLD'S LOWEST PRICES

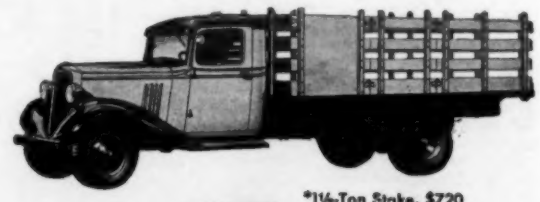
CHEVROLET

AGAIN in 1934, the insistent demand for Chevrolet products has made Chevrolet *the world's largest builder of trucks* as well as of passenger cars. And truck buyers who want to save money will find that these are not only *the world's lowest-priced* trucks, but that they are also very economical to operate and maintain, due to the excellent quality which Chevrolet builds into them. They are big—rugged—dependable trucks. They are powered by *six-cylinder valve-in-head* engines which use very little gas and oil. And they are extremely long-lived . . . built to do their job and do it faithfully over a long period of years. Buy a Chevrolet Truck and you buy fine, dependable, economical haulage service—*at the world's lowest price!*

CHEVROLET MOTOR COMPANY, DETROIT, MICHIGAN

Compare Chevrolet's low delivered prices and easy G.M.A.C. terms. A General Motors Value

Half-Ton Pick-Up, $465 (112" Wheelbase)



*1½-Ton Stake, $720 (157" Wheelbase)

*1½-Ton Chassis, $485 (131" Wheelbase)

1½-Ton Open Express, $655 (131" Wheelbase)

*1½-Ton Platform, $630 (131" Wheelbase)

*1½-Ton Stake, $660 (131" Wheelbase)

*Above are list prices of commercial cars f. o. b. at Flint, Mich. Special equipment extra. *Dual wheels and tires $20 extra. Prices subject to change without notice.*

CHEVROLET TRUCKS

Cleveland Distributor Holds Big Road Show

An exhibition of new 1935 construction and maintenance equipment was held early this month by the W. T. Walsh Equipment Co. in its new warehouses at 3088 W. 106th St., Cleveland, Ohio.

This Ohio Road Show, held in conjunction with the Walsh "house-warming," included an exhibition of the equipment of 32 manufacturers, whose cooperation helped to make the affair a great success. Movies, demonstrations and refreshments were all part of the order of the three days' show.

The following companies were represented by exhibits: American Floor Surfacing Co., Anthony Co., Austin Machinery Co., Barco Mfg. Co., Bonnot Co., Brookville Locomotive Co., William Bros. Boiler & Mfg. Co., Butler Bin Co., Cleveland Rock Drill Co., Continental Roll & Mfg. Co., D-A Lubricant Co., Euclid Road Machinery Co., Fulton Bag & Cotton Mills, Foote Co., Gunitor Co., Frank G. Hough Co., Huber Mfg. Co., Hughes-Keenan Co., International Harvester Co., Ladel Conveyor Co., McKiernan-Terry Corp., Michigan Power Shovel Co., National Carbide Sales Co., Novo Engine Co., Rosco Mfg. Co., Schramm, Inc., Shanklin Mfg. Co., Sterling Wheelbarrow Co., Timken Roller Bearing Co., Wellman Engineering Co., White Mfg. Co.

Members of the Walsh firm, who have had years of practical experience, were on hand to give information and advice.

Equipment Distributors

Alabama–Illinois

RONSTADT HARDWARE & MACHINERY CO.
"Pioneers in Good Merchandising"
TUCSON ARIZONA

BROOKVILLE Locomotives
BAY CITY Shovels
GALION Graders and Rollers
McCORMICK-DEERING Industrial and Crawler Tractors
McCORMICK-DEERING Diesel and Gas Power Units
STERLING Hoists
STERLING Portable Pumps
POMONA Turbine Pumps
MYERS Pumps
KIMBALL-KROGH Centrifugal Pumps
REX Concrete Mixers and Pumps
TOLEDO Road Torches

EDWARD R. BACON CO.
Folsom at 17th St. San Francisco

Adnun—Black Top Pavers
Bearcat Excavators
Burch Spreaders
Byers Shovels, Cranes
Cleveland Rock Drills
Cleveland Trenchers
Dobbie Derricks
Erie Tandem Rollers
Freeman Turntables
Hercules Power Units
Hypressure Jenny Cleaners
Hough Sweepers
Huber Road Rollers
Interstate Tramways
Iowa Crushers, Roadmix Pl.
Jaeger Mixers, Hoists, Pumps
Johnson Bins, Batchers
Jones Saw Benches
Klauer Snow Plows
Lakewood Road Finishers, Forms, Chuting
McKiernan-Terry Pile Hammers
Multi-Foote Pavers
Northern Conveyors
Page Dragline Buckets
Sacramento Oil Distributors
Schramm Compressors
Sun Ray Traffic Signals
Templeton, Kenly Braces, Jacks
Toledo Torches
United 5-T Hd. Winches
Walter Four-Wh. Dr. Trucks
Wehr Motor Graders
Wiard Plows

Member: Associated Equipment Distributors

McDONALD TRACTOR EQUIP. CO.
2303 N. Orange Ave. Orlando, Fla.

Representing

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Cleveland Tractor Company
GMC Truck Company
Killefer Manufacturing Company
Massey-Harris Company
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LITTLE ROCK ARKANSAS

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BATES VALVE BAG CO.—Tie Wires
PAGE STEEL & WIRE CO.—Chain Link Fence
MILWAUKEE CORRUGATING CO.—Lath and Building Products
MAJESTIC CO.—Coal Chutes, Building Products
DETROIT STEEL PRODUCTS CO.—Fenestra Steel Sash and Holorib Roof
SAINO MANUFACTURING CO.—Automatic Fire Doors, also
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DAVIS COMPANY—Large Tilting Mixers, 1, 2, 3, and 4-yd., Weigh Batchers, Batching Plants, Manual or Full Automatic Operation, Readymix Concrete Plants and Equipment, Motor Truck Concrete Mixers and Carriers, Electrically Operated and Controlled Water Meters, Steel Silos, Bins, Bunkers, Hoppers, Bunker Gates, Chutes
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CARBIC Lights
CHICAGO PNEUMATIC Air Compressors
DOMESTIC Pumps
EMERSON Pumps, Valves
GALION Road Machinery
GENERAL ELECTRIC Motors
JAEGER Concrete Mixers
JONES-SUPERIOR Saw Rigs
LAKEWOOD Road Mach., Handling Equipment
LE ROI Engines
LIDGERWOOD Hoists
OWEN Buckets
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General Excavator Co.—Shovels
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Lidgewood Mfg. Co.—Hoists
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White Mfg. Co.—Portable Asphalt Plants, Kettles
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Ames Iron Works—Gasoline Road Rollers
Union Iron Works Inc.—Pile Hammers & Foundation Equipment
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McKIERNAN-TERRY Pile Hammers
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Southern California Distributors for

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"CATERPILLAR" Tractors
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CLEVELAND—Rock Drills
CLYDE—Hoists
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HOUGH-UNIVERSAL—Sweepers
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MacWHYTE—Wire Rope
MULTIFOOTE—Pavers
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A Complete Line of Construction Tools and Equipment Carried in Chicago. *Tel.: Crawford 6200*

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NORTHWEST—Cranes, Shovels, Draglines
BUTLER—Bins
CENTAUR—Road Mowers
WORTHINGTON — Compressors, Drills, etc.
ADAMS—Leaning-Wheel Graders
WHEELING—Corrugated Culvert Pipe
GOOD ROADS—Crushers
LITTLEFORD—Asphalt Heater, Distributors
BURCH—Spreaders
JONES—Saw Rigs
GENERAL—Wheelbarrows
TIMKEN—Detachable Rock Bits
HILYARD-NEWBOLD—Hot or Cold Asphalt Mixing Plants
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Jaeger Machine Company
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Clyde Sales Company
Gallion Iron Works
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Butler Bin Co.
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Chausse Oil Burner Co.
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Members Associated Equipment Distributors

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ALLIS-CHALMERS—Tractors, Graders, Wagons, Power Units
BERG—Concrete Finishers
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DIAMOND—Crushers, Gravel Plants, Washing Equipment
FLEXIBLE—Road Joint Machinery
FOUR-WHEEL DRIVE—Trucks
HELTZEL—Forms, Bins, Batchers
HOUGH-UNIVERSAL—Road Sweepers
HUBER—Rollers
INSLEY—Towers, ¼-yd. Shovels
KOEHRING—Shovels, Cranes
KWIK-MIX—Mixers
LITTLEFORD—Kettles, Heaters, Asphalt Mashinery, Distributors
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MACWHYTE—Wire Rope
NOVO—Engines, Pumps, Hoists
PARSONS—Trenchers, Backfillers
SCHRAMM—Air Compressors, Tools
SHOVELS, PICKS and SMALL TOOLS

BOWMAN-RALSTON TRACTOR & EQUIPMENT CO.

401 E. Florida St. Evansville, Ind.

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LaPlant-Choate Mfg. Co.
Baker Manufacturing Co.
Thew Shovel Company
Killefer Manufacturing Co.
Schramm, Inc.—Compressors
Willamette-Ersted Co.—Hoists
Pioneer Gravel Equip. Mfg. Co.
Anthony Company

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Alemite Equipment
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Bates Bar Ties
Bates Tractors
Beebe Hand Hoists
Black & Decker Tools
Cedar Rapids Crushers
Chain Belt (Rex) Mixers
D-A Lubricants
DuPont Explosives
Dobbie Derricks
Elastite Expansion Joint
Farquhar Engines, Boilers
General Electric Motors
Gulf States Reinforcing Steel
Hansen Excavators
Hauck Heaters and Thawers
Johnson Bins and Hoppers
Lidgerwood Hoisting Machy.
Lincoln Electric Motors
Link-Belt Portable Conveyors
LeRoi Gas Engines
Northwest Shovels, Cranes
Novo Pumps and Hoists
Oxweld Apparatus
Page Buckets
Rogers Bros. Trailers
Sasgen Derricks
Shunk Grader Blades
Toledo Torches
Trackson Tractors
Universal Concr. Accessories
Vulcan Pile Equipment
Wehr Graders
Western Road Machinery
Worthington Pumps
Wyoming Shovels

CLARK-WILCOX COMPANY

790-798 Albany St. Boston, Mass.

Representing

RANSOME—Concrete Mixers, Chuting Equip.
NORTHWEST—Cranes, Shovels, Draglines
BLAW-KNOX—Steel Forms, Bins, Buckets, "Ord" Finishers
CARTER—"Humdinger" Pumps
INGERSOLL-RAND—Air Compressors
ORR-SEMBOWER—Hoists, Boilers, Mixers
ROOS—Shores and Clamps
HAUCK—Oil Burners and Heaters
HAISS—Elevators, Conveyors and Loaders
ALLIS-CHALMERS—Tractors
BAKER—Bulldozers
SARGENT—Plows
BEEBE BROS.—Hoists
CLEVELAND—Formgraders
C. R. JAHN CO.—Trailers
BURCH—Rear Plows, Road Machinery

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Blaw-Knox Bins, Forms, Buckets, Finishers
Clyde Hoists, Derricks
Cleveland Formgraders
Diamond Crushers, Screens
Domestic Pumps
Euclid Wagons, Scrapers
Gopher Road Signs
Haiss Loaders
Hercules Road Rollers
Hough-Universal Sweeper
Keppel Industrial Cars
McKiernan-Terry Pile Hammers, Extractors
M-W Lubricants
Michigan Power Shovel
Northern Conveyors
Northwest Shovels, Cranes
Oshkosh 4-whl. Dr. Trucks
"RB" Power Subgraders
Smith Mixers, Pavers
Sullivan Compressors, Tools
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Contractors and Engineers Monthly

RIGHT - L. A. PRICE, PRESIDENT, H. S. PRICE, SUPERINTENDENT AND R. F. KELLOGG, ENGINEER HORTON & PRICE CONST. CO.
SEE PAGE 1

C. & E. M. PHOTO

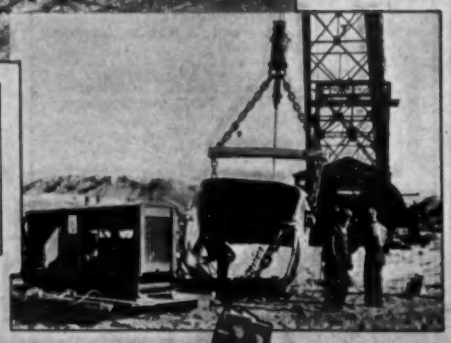
ONE OF GREESON'S MODEL L TRACTORS HAULING A 12-YARD CRAWLER WAGON
SEE PAGE 1

C. & E. M. PHOTO

THE WELL-GROOMED WALKING DRAGLINE WHICH HANDLED 200,000 YARDS A MONTH
SEE PAGE 1

A ONE-TRIP BLACK TOP SURFACING OUTFIT OF INLAND CONST. CO. WORKING ON U.S. 87E BETWEEN SHERIDAN, WYO., AND BILLINGS, MONT.

ON THE BOYCE & IGO ALL-AMERICAN CANAL CONTRACT NEAR WINTERHAVEN, CALIF., A STABLE-ARC WELDER DOES DENTAL WORK ON DRAGLINE BUCKET TEETH AFTER A CROSS-COUNTRY TRIP BEHIND A TRACTOR



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A TYPICAL CONCRETE BRIDGE OF 20-FOOT SPAN ON THE LANE CONSTRUCTION CO. CONTRACT IN CENTRAL CONNECTICUT
SEE PAGE 5

12-YARD CARRYALL SCRAPER OUT OF THE WEST PLAYED TO S.R.O. WHEN HAULED ON ITS DOUGHNUT TIRES THROUGH NEW YORK STREETS

THE START OF THE COFFERDAMS ON WEST BANK OF COLUMBIA RIVER AT GRAND COULEE IN FOREGROUND IS SECTION OF CONVEYOR AND ACROSS THE RIVER EXCAVATION WHERE THE SECOND COFFERDAM WILL BE
SEE PAGE 8